

Taxonomic studies of Australian *Senecio* (Asteraceae): 5. The *S. pinnatifolius*/*S. lautus* complex

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Abstract

A morphological study of the Australian *Senecio pinnatifolius*/*S. lautus* complex has resulted in a revised classification for this group. Australian plants historically included in *S. lautus* G.Forst. ex Willd. are treated as distinct at the level of species from this and other lautusoid taxa from New Zealand. Seven new species are described, predominantly from arid or semiarid regions. These are: *S. brigalowensis* I.Thomps., *S. depressicola* I.Thomps., *S. eremicola* I.Thomps., *S. hamersleyensis* I.Thomps., *S. lacustrinus* I.Thomps., *S. spanouerus* I.Thomps., and *S. warrenensis* I.Thomps. *Senecio spatulatus* A.Rich. is recognised as a species and two new varieties are described: *S. spatulatus* var. *laifruetus* I.Thomps. and *S. spatulatus* var. *atenuatus* I.Thomps. The name *S. pinnatifolius* A.Rich. is applied to a complex of forms occurring predominantly in mesic regions of Australia, and a new infraspecific classification is presented. *Senecio capillifolius* Hook.f., *S. lautus* subsp. *alpinus* Ali, *S. lautus* subsp. *maritimus* Ali, *S. carnulentus* var. *latilobus* Steetz, and *S. lautus* var. *lauceolatus* Benth. are circumscribed and recombined as varieties of *S. pinnatifolius* to become *S. pinnatifolius* var. *capillifolius* (Hook.f.) I.Thomps., *S. pinnatifolius* var. *alpinus* (Ali) I.Thomps., *S. pinnatifolius* var. *maritimus* (Ali) I.Thomps., *S. pinnatifolius* var. *latilobus* (Steetz) I.Thomps., and *S. pinnatifolius* var. *lauceolatus* (Benth.) I.Thomps. respectively. *Senecio pinnatifolius* var. *serratus* I.Thomps. and *S. pinnatifolius* var. *leucocarpus* I.Thomps. are described as new. The introduced species *S. madagascariensis* Poir. and the native species *S. condylus* I.Thomps. are similar to the above lautusoid taxa and descriptions of these two species are also presented. Keys to all of the above taxa are presented.

Introduction

The taxonomic history of the Australian lautusoid *Senecio* complex followed the early sequence of events familiar to students of Australian botanical history. Between 1834 and 1845, a dozen new names were applied to members of this complex by various authors, and this burst of activity was followed by a typically more conservative synthesis by Bentham (1867). Bentham assigned most taxa to *Senecio lautus* G.Forst. ex Willd., a species described from a collection from New Zealand. Within *S. lautus* he described one variety endemic to Australia, var. *lauceolatus* Benth., based on collections from Victoria with distinctive leaf morphology. Two lautusoid entities segregated from *S. lautus* were *S. spatulatus* A.Rich. and *S. capillifolius* Hook.f. based on the habit and capitulum size in the former, and the leaf morphology of the latter. For nearly a century following Bentham's treatment, there was little taxonomic endeavour pertaining to this complex in Australia.

Ornduff (1960) studied the lautusoid complex with a primary focus on New Zealand forms and decided that Australian forms were endemic to Australia and distinct at a level of species from New Zealand forms. Criteria for this determination were not elaborated on. Ali (1964) agreed that Australian forms were endemic but considered that they should be treated as being distinct at the level of subspecies. He indicated that leaf shape, dimensions of the corolla (ligules relatively short in New Zealand forms) and different breeding systems could separate the New Zealand subspecies from the Australian subspecies he was later to describe. Ali produced the first major work on the Australian complex; he examined the biology, genetics and ecology of the group as well as morphology. In his final paper on the complex (Ali 1969), he described four Australian

subspecies of *S. lautus*. This classification was based on differences in leaf morphology and, to a lesser extent, on plant size. Unfortunately, his key, descriptions and supplementary information lacked detail. The fact that he characterised a large percentage of specimens that could not be placed in his subspecies as 'aff.' entities, indicated that satisfactory taxonomic resolution of the complex was not accomplished.

In the early 1980s, the existence and seemingly rapid expansion of an introduced species, *S. madagascariensis* Poir., in eastern Australia was recognised. Prior to this, specimens of this species had been assigned to *S. lautus*. In the past few years, studies by Scott *et al.* (1998) and Radford *et al.* (2000) have indicated that the form of *S. madagascariensis* established in Australia corresponds to plants native to South Africa rather than Madagascar. Complicating matters, however, is the view of some authors that *S. madagascariensis* and *S. inaequideus* DC. in South Africa are difficult to distinguish, and that these and other species from Africa are best considered as part of an *S. inaequideus* complex until satisfactory taxonomic resolution can be achieved.

Michael (1992) indicated his general dissatisfaction with Ali's classification and briefly gave his impressions of the nature of the diversity of this complex in Australia. Notably, the subsumation of *S. spatulatus* under *S. lautus* subsp. *maritimus* was disapproved of by Michael.

Soon after, Belcher (1993) resurrected the idea that Australian lautusoid forms were distinct at species level, and provided morphological evidence to support this. Belcher described differences in the positioning, shape, and pigmentation pattern of the calycular bracteoles and the lack of sclerenchymal thickening in the stereome of the phyllaries in *S. lautus* s. str. from New Zealand. Belcher rather cryptically contrasted only some of the Australian forms (of unspecified provenance) in these respects with *S. lautus* s. str. before stating that other Australian forms (also of unspecified provenance) have calycular bracteoles not assignable to either type. Finally, in this paper, Belcher nominated *Senecio pinuatifolius* A.Rich. as the best available name for the Australian forms.

A recent study by Radford *et al.* (2004) has shed some further light on the Australian lautusoid complex. In this study, which did not present any taxonomic changes, the number of phyllaries per capitula was suggested as a useful character to discriminate forms from the Brigalow region in southern Queensland and forms from central Australia from other Australian forms. Although a detailed analysis of leaf morphology did not lead to any discrete groupings, leaf length, width, shape, degree of lobation and toothing, and succulence were used in a key to putative variants presented by Radford. An examination of achenial morphology in Australian lautusoids produced some trends but no characters that were found to discriminate variants. Isozyme analysis did not produce well-defined groups and there was some conflict with the pattern produced by morphological data.

In the following purely morphological study, herbarium material from all state herbaria was examined and a range of new characters assessed for taxonomic usefulness. The segregation of Australian forms from New Zealand forms is supported on the basis of a combination of characters, all of which were alluded to by either Ali or Belcher as summarised above.

Materials and Methods

Herbarium specimens from AD, BRI, CANB, DNA, HO, MEL, NE, NSW, and PERTH were examined. Field observations and collections made in Victoria and south-eastern New South Wales supplemented the herbarium data. The circumscriptions of, and morphological variation within, previously recognised taxa was critically assessed and new taxonomic concepts developed and tested. Both the more detailed examination of previously utilised characters and the adoption of novel characters contributed to the development of a revised classification. Distribution maps were generated using the ArcView computer program.

Results

Several new non-foliar taxonomic characters have provided a basis for a new classification of the Australian lautusoid complex. These include size of taproot, phyllary and calycular bracteole morphology including width of the stereome and hyaline margin portions and pigmentation pattern (Fig. 2), the number of phyllaries per capitulum, the ratio of ray floret number to phyllary number, the size of and dimorphism in the achenes, and details of the indumentum of the achenes.

Leaf morphology (Fig. 1). The bewildering variation in leaf morphology in the Australian lautusoid complex has been a stumbling block to developing a satisfactory classification for this group. The key to subspecies that Ali presented was based largely on the presentation of leaf silhouettes, with categories named as alpha, beta and gamma types. Although the current study has shown that there is some merit in his groups, there is significant scope for misinterpretation of his key, and the absence of descriptions of the subspecies compounds the problem. It is important to understand that, in all or most Australian lautusoids, the occurrence and degree of leaf division is highly plastic. Individuals, let alone populations, can sometimes contain a mixture of undivided and divided leaves (Fig. 1c). Leaf size and shape also fluctuates greatly within populations according to environmental conditions and whether the leaf is of a stem, branch or secondary branch. It is important that comparisons are always made between leaves occurring in the same region of the plant. Nevertheless, in this study the following leaf characters have been recognised as taxonomically useful and they make a modest contribution to the identification of taxa in the new classification.

The average position of leaf segments along the leaf (distal, central or proximal) and to a lesser extent the total number of marginal points (including callus points, denticulations, teeth, lobes, and pinnate segments) developed along a leaf are reasonably consistent within most taxa. For instance, the gamma-type leaf morphology that Ali recognised for *S. lautus* subsp. *alpinus* demonstrates an average position of marginal points that is slightly distal to mid-leaf and has several to numerous marginal points (Fig. 1b); his beta-type morphology corresponding to *S. lautus* subsp. *dissectifolius* demonstrates an average position of segments as proximal to mid leaf and has few marginal points (Fig. 1a). The shape of the rachis (see glossary below) changes from oblanceolate through elliptic to lanceolate from the base to the summit of stems or branches. However, the extent to which this progression occurs is variable between taxa (examples of upper-branch leaves in Fig. 1d).

Leaf succulence and fleshiness can be useful taxonomically, although succulence in particular can vary within populations according to environmental conditions, e.g. proximity to the coast.

Geography. A significant finding in this study of the *S. pinnatifolius*/*S. lautus* complex has been the predominantly allopatric distributions of the native taxa. In most instances two or more taxa are not likely to be found growing together, or if so only in relatively narrow zones at the interfaces of their distributions. However, *S. spathulatus* is likely to be sympatric with varieties of *S. pinnatifolius* along the coast, and *S. spanomerus* I.Thomps. with *S. pinnatifolius* var. *uaritinnus* (Ali) I.Thomps., also along the coast. The distribution of the introduced *S. madagascariensis* appears to broadly overlap the distribution of *S. pinnatifolius* var. *pinnatifolius* and possibly that of *S. pinnatifolius* var. *serratus*; however, there are no records indicating whether the native and introduced species are closely intermingled at particular sites.

Terminology

Chevron (Fig. 2a): A chevron is an upside-down V of purple pigmentation delineating the apex of the stereome of inner phyllaries. It is a feature of *S. pinnatifolius* var.



Figure 1. Leaf morphology: a. Leaves with marginal points absent or few (lower branch leaf and a mid-branch leaf from a single plant of *S. spanouerus*); b. Leaves with numerous marginal points and their average position distal to mid-leaf (*S. pinnatifolius* var. *alpinus*, mid-stem leaves from two different plants); c. Within-population variation in number of marginal points and degree of dissection (mid-stem leaves of *S. pinnatifolius* var. *lanceolatus*; from Western Port Bay, Victoria); d. Variation in shape in upper-branch region (from l to r): *S. spanouerus* (n.b. average position of segments is proximal to mid-leaf), *S. pinnatifolius* var. *lanceolatus*, *S. pinnatifolius* var. *pinnatifolius* (from east coast of New South Wales), *S. pinnatifolius* var. *maritimus*. Magnification: a–c times 0.7; d times 1.2.

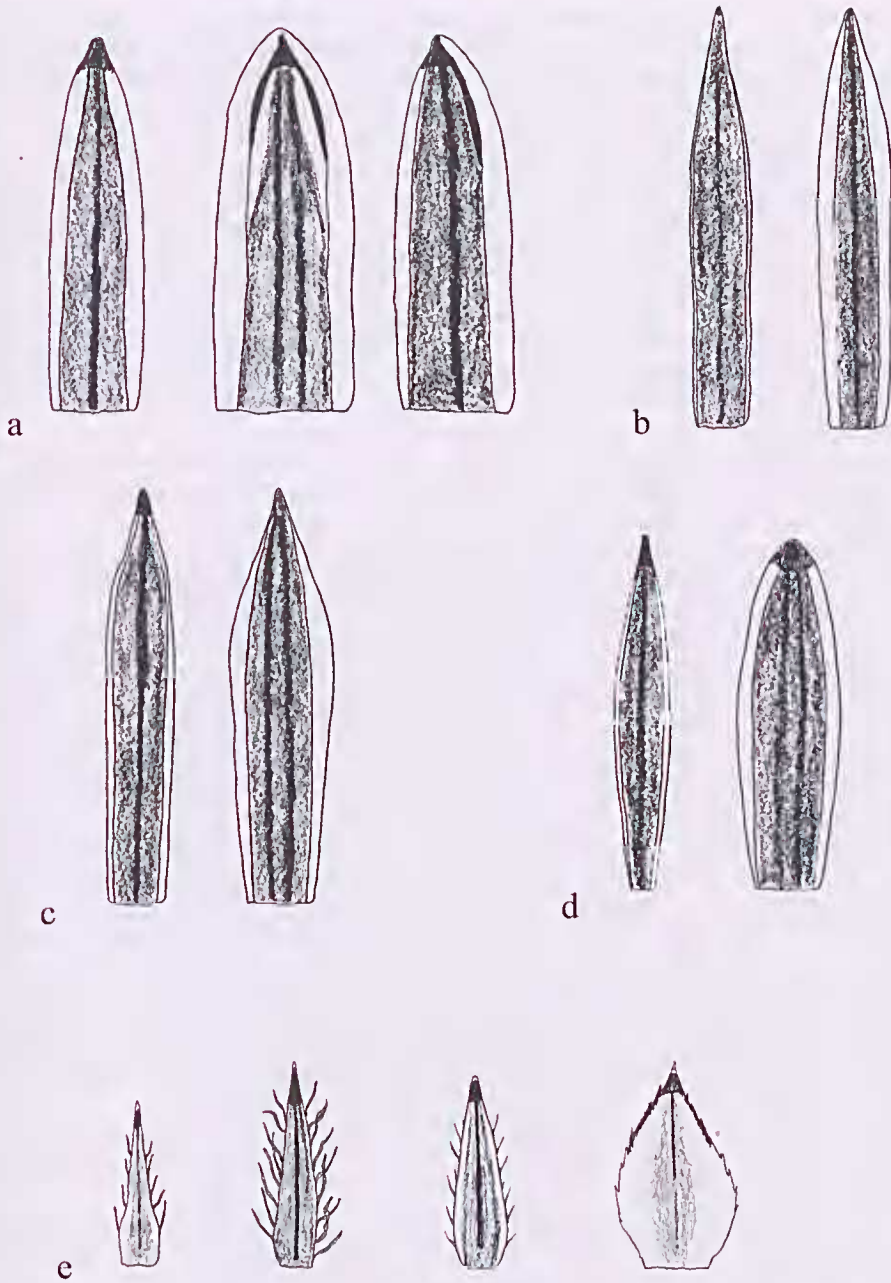


Figure 2. Phyllary and bracteole morphology: a–d. Examples of phyllaries (from l to r): outer, inner and, in a, intermediate. a. *S. pinnatifolius* var. *lanceolatus* (note full chevron on inner phyllary and half chevron on intermediate phyllary); b. *S. ereuicola*; c. *S. pinnatifolius* var. *pinnatifolius*; d. *S. spanomerus*. e. Examples of calycular bracteoles (from l to r): *S. brigalowensis*, *S. spanomerus*, *S. pinnatifolius* var. *pinnatifolius*, *S. pinnatifolius* var. *latilobus*. Magnification: All times 10.

lauceolatus and, to a lesser extent, *S. pinnatifolius* var. *latilobus*. The two arms of the chevron extend 0.5–1.5 mm down the margin from the apex of the stereome. In *S. pinnatifolius* var. *lauceolatus* the chevron may be just visible with the naked eye, and it delineates a stereome that is relatively broad distally. In *S. pinnatifolius* var. *latilobus* the chevron is finer and magnification is likely to be required to detect it.

Dimorphic achenes: A syndrome present in some lautusoid species and in species allied to *S. glossaultus* (Thompson 2005) where the achenes of ray florets are plumper and often longer, have an indumentum of more robust, longer papillose hairs, and have a broader carpodium, and where the carpodium fits over an enlarged and/or thickened and variably projecting attachment point on the perimeter of the receptacle (reminiscent of a ball-and-socket joint). Furthermore, these achenes are typically reddish or orangish in contrast to brown or olive-green achenes of the disc; in taxa with homomorphic achenes this colour distinction is absent or less pronounced. The achenes of the ray florets also have a tendency to remain attached for longer than the achenes of the disc and may persist until the phyllaries become reflexed.

Divided (of leaves): When the sinuses extend more than halfway towards the midrib.

Homomorphic (of achenes): Where all achenes of a capitulum are similar in shape and indumentum (cf. dimorphic)

Hyaline margin of phyllaries and bracteoles (Fig. 2): The more or less transparent rim of tissue surrounding the herbaceous centre (stereome) of phyllaries and calycular bracteoles. This margin is more sharply defined in phyllaries. The width, see under phyllaries, is fairly consistent within, and has some value in discriminating between, taxa. In some taxa, e.g. *S. pinnatifolius* var. *maritimus* the margin narrows relatively abruptly in the distal third, whereas in many other taxa the narrowing is slight and gradual throughout.

Marginal points: Points occurring along the margin of leaves including callus points, denticulations, teeth, lobes and segments. If points are lacking, the margin is entire.

Pappus-ring: The rim of pale tissue at the summit of an achene to which pappus bristles attach. This rim is sometimes exceeded by the papillose hairs.

Phyllaries: inner, outer and intermediate (Fig. 2): This definition applies to the taxa treated in this paper but is largely applicable to many Senecionoid genera. The involucre of *Senecio* is uniseriate but there is a pattern of overlapping of the margins, with outer phyllaries overlapping the adjacent inner phyllaries to the outside. The margin of outer phyllaries is narrower and is sometimes vestigial. Similarly, the stereome q.v. of outer phyllaries is generally also broader than that of inner phyllaries, although occasionally an inner phyllary has a very narrow stereome. The regular alternation of outer and inner phyllaries is frequently upset by the presence of interspersed intermediate phyllaries. These are morphological chimeras of an outer and inner phyllary. One or more of these phyllaries are likely to be present in any one involucre (Fig. 2a).

Rachis of leaves: The central zone of uninterrupted lamina, i.e. lamina that is not broken into by sinuses of teeth, lobes etc. The rachis (at its widest) in Fig. 1a is c. 1.3 mm, and in Fig. 1b (left) it is c. 8 mm.

Stereome (Fig. 2): The herbaceous portion of a phyllary. Embedded in the stereome are one or two longitudinal resin ducts of variable prominence extending from base to apex, and surrounding the stereome is a hyaline margin.

Unit inflorescence: Defined in this paper as a group of capitula terminating a stem or branch where all their supporting primary branchlets are leafless.

Key to species

This key is based predominantly on pressed herbarium material. Capitular characters will commonly require magnification. The involucre diameter given is for unpressed specimens and is measured mid-involucre. Pressing increases the diameter/width by up to 50%. Leaves refers to those leaves in the middle third of stems or major branches (leaves of short inflorescence branches and uppermost leaves of branches will be considerably smaller).

- 1 All or most capitula in an inflorescence with phyllaries c. 13 or c. 20 and number of ligules several fewer than number of phyllaries, i.e. ligules 8–10, phyllaries 13; ligules c. 13, phyllaries c. 20 (arid, semiarid or mesic environments)
- 2 Stem and major branch leaves commonly undivided, sometimes with a few lobes per side; leaf margin with frequent often minute marginal points per side (often difficult to ascertain in pressed material); phyllaries mostly c. 20; achenes 1.5–2.2 mm long, 0.3–0.5 mm diam1. **S. madagascariensis*
- 2: Stem and major branch leaves often divided or not; leaf margin with few to numerous marginal points per side, but if numerous then leaves generally markedly serrate, lobate or pinnatisect; phyllaries mostly c. 13 or mostly c. 20; achenes (1.8–)2.0–5.0 mm long, 0.5–0.8 mm diam.
- 3 Lower surface of leaves often with numerous somewhat persistent coarse hairs or hair-bases; calycular bracteoles with intense purple pigmentation in distal half to one third; achenes of ray florets c. 1 mm longer than those of disc florets and with a much broader carpopodial ring (Perth region and Busselton, Western Australia)11. *S. coudylus*
- 3: Lower surface of leaves commonly glabrous or nearly so, sometimes occasional long hairs persistent; calycular bracteoles with pigmentation usually not as intense and/or extensive as above; ray achenes not dimorphic as above or if ever approaching this degree of dimorphism, then only the distal quarter or less of calycular bracteoles pigmented (widespread)
- 4 Phyllaries > 5.0 mm long and mature achenes of ray florets > 3.0 mm long; achenes of ray florets slightly longer than those of disc florets; attachment zones on receptacle for achenes of female florets more prominent than those for achenes of disc florets
- 5 Phyllaries mostly c. 20; ligules mostly c. 13 (central Australia between latitudes 22° and 27°).....8. *S. ereunicola*
- 5: Phyllaries mostly c. 13; ligules mostly c. 8; (arid southern Australia south of latitude 26°).....9. *S. lacustrinus*
- 4: Phyllaries < 5.0 mm long and/or mature ray achenes < 3.0 mm long, or if phyllaries and achenes slightly longer then achenes or receptacle not as above
- 6 Annuals, not developing bark on lower stems and taproot; leaves pressing thin; margin of mid-stem leaves with several to numerous denticulations/ teeth per side; in dried specimens paler involucre commonly contrasting with a brown to dark-brown receptacle (in some or most capitula) (southern Queensland and adjacent eastern parts of Northern Territory and South Australia)
- 7 Phyllaries mostly 13 (and ligules c. 8), occasionally phyllaries mostly c. 18; achenes 1.6–2.5 mm long; achenes of female florets with surface fully obscured by coarse papillose hairs, with these hairs strongly overtopping pappus-ring (Lake Eyre basin, far south-western Queensland, north-eastern South Australia, also eastern Northern Territory).....7. *S. depressicola*
- 7: Phyllaries mostly c. 18–22 (and ligules c. 13); achenes 2.5–3.0 mm long; achenes of female florets with surface partly obscured by fine hairs, with these hairs hardly overtopping pappus-ring (semiarid to arid south-eastern to south-central Queensland)6. *S. brigalowensis*
- 6: Perennials (commonly), with bark developing on lower stems and major branches and taproot; leaves pressing thin or somewhat fleshy; margin of stem/major branch leaves lacking or with 1 or 2 denticulations/teeth per side, occasionally with several; in dried specimens involucre and receptacles not contrasting as above or if so marginal points on mid-stem (mid-branch) leaves few per side (north-western and south-eastern Australia)

- 8 Leaves not fleshy, pressing thin, above mid-branch tapering to subpetiolate basally; margin of leaves entire (Hamersley Range and environs and Cape Range, Western Australia)...**10. *S. hauersleyensis***
- 8: Leaves often slightly fleshy, pressing thin or thick, above mid-branch often very narrow but generally not tapering basally; margin of leaves entire or with denticulations (southern and eastern Australia)
- 9 Mid-branch leaves 2–3-pinnatisect**4. *S. pinuatifolius***
- 9: Mid-branch leaves 1-pinnatisect
- 10 Segments of leaves \pm filamentous (< 0.8 mm wide dried; l:w ratio > 15); calycular bracteoles 1–3 mm long, purple or black-tipped, mostly without coarse white hairs; achenes glabrous or variously hairy (dry hills, often rocky).....**4. *S. pinuatifolius***
- 10: Segments of leaves mostly narrow-oblong to narrow-linear (mostly > 0.8 mm wide dried; l:w ratio < 15); calycular bracteoles 1.8–3.5 mm long, generally black or brown-tipped, often with coarse white hairs; achenes \pm densely hairy (semi-arid plains).....**5. *S. spauouerus***
- 1: All or most capitula in an inflorescence with number of phyllaries c. 13, and number of ligules similar (semiarid or mesic environments)
- 11 Leaves very fleshy, to 5 cm long; involuere 5–11 mm long; broader stercomes to 3.0 mm wide, not ridged on drying; achenes 3.0–7.0 mm long; pappus usually persistent (coastal or near coastal dunes)
- 12 Undivided leaves with l:w ratio < 4 (rachis of divided leaves with l:w ratio < 15); margin of leaves usually serrate or serrulate; calycular bracteoles not or hardly overlapping at anthesis; achenes glabrous or variously hairy (eastern Australia).....**2. *S. spathulatus***
- 12: Undivided leaves with l:w ratio > 4 (rachis of divided leaves with l:w ratio > 15); margin of leaves entire or nearly so; calycular bracteoles overlapping at anthesis; achenes densely hairy (south-western Western Australia).....**3. *S. warreueensis***
- 11: Leaves thin to fleshy, to 15 cm long; involuere 3–8 mm long; broader stereomes to 1.5 mm wide, commonly ridged on drying; achenes 1.6–4.5 mm long; pappus mostly caducous (habitat various)
- 13 Plants \pm erect, developing a stout taproot; mid-branch leaves with l:w ratio of rachis mostly > 10 , \pm lacking marginal points except for 0–2(–3) entire segments per side, not developing straplike basal segments from an undilated rachis; segments \pm linear but not filamentous (rachis mostly > 0.8 mm wide; l:w ratio < 15 when dried); outer phyllaries with hyaline margin very narrow (to c. 0.1 mm wide); calycular bracteoles narrow-ovate to lanceolate, usually \pm all herbaceous and distinctly black- or brown-tipped; achenes to 2.8 mm long, less than half length of phyllaries; \pm densely papillose-hairy with hairs of achenes of ray florets exceeding pappus-ring (predominantly semiarid lowland environments of southern Australia).....**5. *S. spauouerus***
- 13: Plants not entirely as above (widespread but generally not as above).....**4. *S. pinuatifolius***

Taxonomy

1. *Senecio madagascariensis* Poir., *Encycl.*, suppl. 5: 130 (1817)

Type: Madagascar, *Commerson* [‘Cette plante a été récueillie par Commerson à l’Île de Madagascar’], *Herb. Desf.* T: ?P n.v.

Perennial to 0.6 m tall, erect, \pm glabrous. *Taproot* often inconspicuous. *Leaves* in mid-region of stems or major branches mostly 3–10 cm long, with marginal points 15–25 per

side, mostly undivided, not fleshy, thin on pressing; base attenuate; margin denticulate or callus-denticulate; undivided leaves very narrow-elliptic to linear; divided leaves with 1 or 2 narrow-triangular lobes per side, average position \pm central. *Uppermost leaves* base sometimes slightly dilated, with auricles denticulate. *Inflorescences* of 2–20 capitula. *Capitula*: calycular bracteoles 8–12, narrow-ovate to lanceolate, 1.5–2.0 mm long, 0.5–0.8 mm wide, with stereome sometimes suffused purple, with margin \pm glabrous; apex acute to peracute, pigmented purple or black in zone c. 0.5 mm long; involucre 4.0–6.0 mm long, c. 3–5 mm diam.; phyllaries c. 20 (for all or most capitula); apex brown or black; stereome somewhat fleshy, often suffused with purple below apex; resin ducts distinct, pale or orange on drying; inner phyllaries: broader stereomes 0.5–0.8 mm wide; margin 0.2–0.3 mm wide; outer phyllaries: margins vestigial to c. 0.1 mm wide proximally. *Florets* 50–70; ligulate florets e. 13, with ligule 5–10 mm long; corolla of disc florets 3–5.5 mm long. *Achenes* homomorphic, c. 40% of length of phyllaries, 1.5–2.2 mm long, 0.3–0.5 mm diam., mid to dark brown, with ribs flat; papillose hairs in bands covering c. 20–50% of surface, mostly appressed, with l:w ratio c. 2–3; hairs of achenes of ray florets not exceeding pappus-ring. *Pappus* 3–5 mm long, caducous. (Fig. 4)

Flowers most of the year.

Distribution and Habitat: Occurs in far eastern Australia, from south-eastern Queensland south to far south-eastern New South Wales. Also recorded a few times from Melbourne and the Mornington Peninsula in south-central Victoria but not naturalised (Fig. 3a). Grows in various soils usually in disturbed sites particularly roadsides and cleared land.

Notes: A native of South Africa and Madagascar. Probably naturalised in Australia for some time before it was recognised as an introduced species in the 1980s. *Senecio madagascariensis* can be distinguished from *S. pinnatifolius*, *S. brigalowensis* and other similar lautusoid species by a combination of characters: more numerous phyllaries, thinner leaves that are mostly undivided but with numerous marginal points (mostly as tiny denticulations), and shorter and more slender achenes with smaller papillose hairs. The achenes also tend to be more tapered basally and sometimes more so apically. The stereome of phyllaries and bracteoles are sometimes suffused purple and this character has not been observed in the native lautusoid species in Australia.

Selected specimens examined: QUEENSLAND: 1 km N of Mt Maroon, P.I. Forster PIF6841, L.H. Bird & A.R. Bean, 26.v.1990 (BRI, MEL); Tomewin, C.E. Woolcock & D.T. Woolcock, 10.vii.1985 (MEL). NEW SOUTH WALES: 'Cooplacurripa', Wingham–Nowendoc Road, R. Holtkamp 21, 19.vi.1996 (CANB, MEL, NE); Port Macquarie, L. Pedley 5543, 25.vii.1990 (AD, BRI, DNA, MEL, NSW, PERTH); alongside Karuah State Forest, south of Stroud, J.R. Hosking 1279, 29.viii.1996 (CANB, MEL, NE, NSW). VICTORIA: Balnarring, on road verge of Hastings-Flinders Road, R.J. Adair s.n., 14.vii.1991 (MEL).

2. *Senecio spathulatus* A.Rich., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 125 (1834)

Type: Tasmania, D'Entrecasteaux Channel ['Creseit in Nova-Hollandia loco vulgo dicto Detroit d'Entrecasteaux'], A. Lesson; *holo*: P n.v.

Perennial to 0.5 m tall, sprawling to prostrate, \pm glabrous. *Primary roots* not seen; developing roots from prostrate stems. *Leaves* in mid-region of stems or major branches 1–5 cm long, with marginal points 0–15 per side, mostly undivided, very fleshy, drying thick and wrinkled; base cuneate to truncate; margin dentate, serrate or denticulate; undivided leaves obovate or oblanceolate; divided leaves with 1–3 narrow-oblong segments per side, average position more or less central. *Uppermost leaves* sometimes oblong or elliptic; base sometimes becoming weakly clasping. *Inflorescences* of 1–5 capitula. *Capitula*: calycular bracteoles 8–12, imbricate at anthesis or not, ovate to narrow-ovate, 1.5–3.0 mm long, 1.0–1.5 mm wide; with margin bearing weak hairs; apex subacute to acute, pigmented purple in zone c. 0.5 mm long; involucre 5.0–11.0 mm long,



Figure 3. Distribution of a. *S. uadagascariensis*; b. *S. spathulatus* var. *spathulatus*; c. *S. spathulatus* var. *latifructus*; d. *S. spathulatus* var. *attenuatus*; e. *S. warrenensis*.



Figure 4. *S. madagascariensis* (P.I. Forster PIF28891 MEL).

3–10 mm diam.; phyllaries c. 13, rarely a minority of capitula with 8–10, with apex pigmented black or purple or unpigmented; stercome fleshy, commonly drying dark brown; resin ducts obscure; inner phyllaries: broader stercomes 1.0–3.0 mm wide; margin 0.3–0.4 mm wide broadening to 0.8–1.2 mm wide in proximal two-thirds; outer phyllaries: margin 0.1–0.3 mm wide, broadening to 0.3–0.8 mm wide in proximal two-thirds. *Florets* 60–140; ligulate florets c. 13, with ligule 10–25 mm long; corolla of disc florets 5–8 mm long. *Achenes* ± homomorphic, 50–60% of length of phyllaries, 3.0–7.0 mm long, 0.5–1.2 mm diam., orange, golden, light brown, or straw coloured, with ribs often convex; papillose-hairs sparse to dense in bands or covering entire surface, ± appressed, with l:w ratio c. 3–5, or achenes glabrous; hairs of achenes of ray florets not exceeding pappus-ring. *Pappus* 5–7 mm long, persistent.

Flowers most of the year.

Notes: *Senecio spathulatus* is a specialised coastal species occurring mostly on frontal dunes and forming low, broad clumps. It is characterised by short fleshy leaves, large fleshy capitula, and large fruit with a persistent pappus. There are three varieties.

- 1 Mid-branch leaves usually tapering somewhat basally (width 3 mm from base commonly < 1/3 of the maximum width); achenes ± densely hairy (central coast of New South Wales).....2c. var. *atenuatus*
- 1: Mid-branch leaves not tapering or tapering slightly basally (width 3 mm from base commonly > 1/3 of the maximum width); achenes glabrous or sparsely to moderately hairy (distribution further south than above)
 - 2 Achenes 4.0–7.0 mm long, c. 0.8–1.2 mm diam., straw coloured to pale brown, glabrous, rarely with scattered hairs (eastern Victoria, far south-eastern New South Wales).....2b. var. *latifructus*
 - 2: Achenes 3.0–5.5 mm long, c. 0.5–0.8 mm diam., sparsely to moderately hairy or glabrous, surface golden or dark brown (Tasmania).....2a. var. *spathulatus*

2a. *Senecio spathulatus* A.Rich. var. *spathulatus*

Leaves in mid-region of major branches tapering slightly basally. *Capitula:* involucre 5.0–9.0 mm long, 3–7 mm diam.; broadest stereome 1.2–2.0 mm wide. *Achenes* 3.0–5.5 mm long, c. 0.5–0.8 mm diam., orange-brown or mid-brown, with ribs narrow, prominent; papillose hairs absent or sparse to dense in narrow bands. *Pappus* longer than the achene, with bristles not fused basally.

Distribution and Habitat: Occurs on the southern and western coasts of Tasmania, and on King Island in Bass Strait (Fig. 3b).

Notes: This variety of *S. spathulatus* is sympatric and possibly hybridises with *S. pinatifolius* var. *maritimus* on the southern and western coastlines of Tasmania and on King Island. Leaves of these taxa are similar in size; however, *S. spathulatus* var. *spathulatus* typically has serrulate leaves that dry yellow, whereas *S. pinatifolius* var. *maritimus* has entire leaves or leaves with few teeth that dry dark olive-green. The capitula of *S. spathulatus* var. *spathulatus* are larger and the achenes longer and with a persistent pappus. Further field work is desirable to better understand the relationship between these two taxa.

Selected specimens examined: **TASMANIA:** Stanley Beach, *J. Somerville*, 1.v.1949 (HO); Ocean Beach, Strahan, *H.N. Barber*, July 1955 (HO); Mt Cameron West, *T.E. Bnms* 348, 5.iii.1960 (HO); Prion Beach, *A.M. Buchanan* 3467, 26.iv.1984 (HO); Mulcahy Bay, *A.M. Buchanan* 8026, 19.i.1986 (HO); Surprise Bay, *A. Moscal* 901, 25.i.1982 (HO); Ocean Beach, *A.M. Buchanan* 15370, 24.xi.1998 (HO); Henty Dunes, c. 15 km north of Strahan, *P.C. Heyligers* 93004, 2.ii.1993 (CANB); Christmas Island, King Island, *N.P. Brothers*, 20.xi.1987 (HO); Near Marrawah, Tasmania, toward Green Point, *E.M. Canning* 1843, 26.i.1969 (CANB, NSW).

2b. *Senecio spathulatus* var. *latifructus* I.Thomps., var. nov.

A varietate typica capitulis majoribus, acheniis majoribus pallidus differt.

Type: Victoria, Lakes Entrance, at westerly exit to beach from Lions Park at the end of East Beach Road, *P.C. Heyligers 84004*, 27 Mar. 1984; holo: MEL; iso: CANB.

Leaves in mid-region of major branches not tapering or tapering only slightly basally. *Capitula:* involuere 7.0–11.0 mm long, 5–10 mm diam.; broadest stereomes 2.0–3.0 mm wide. *Achenes* 4.0–7.0 mm long, c. 0.8–1.2 mm diam., pale brown or straw coloured, with ribs sometimes indistinct; papillose hairs absent or rarely scattered in narrow bands. *Pappus* sometimes shorter than the achene, particularly for marginal achenes, with bristles sometimes fused basally (Fig. 5)

Etyymology: The epithet refers to the broad fruit of this variety (*L. latus*, broad, and *fructus*, fruit).

Distribution and Habitat: Occurs on the Victorian coast east from Wilsons Promontory and in adjacent areas of far south-eastern New South Wales (Fig. 3c).

Notes: This variety has the largest capitula and achenes of the three varieties. Although mostly with glabrous, sometimes unribbed achenes, occasional specimens have pale yellow achenes with scattered hairs.

Selected specimens examined: NEW SOUTH WALES: Nadgee Nature Reserve, Cape Howe, *J. Miles s.n.*, 12.xi.2002 (MEL). VICTORIA: Lake Tyers, ± 6 km ENE of PO, on frontal dunes on Ninety Mile Beach, *R.J. Adair 2240*, 1.v.1987 (AD, CANB, MEL); Mt Singapore, [Wilson's Promontory] National Park, *J.A. Leach*, May 1910 (MEL); Tamboon Inlet, near Cann River, *M. Walton*, 29.xi.1956 (MEL); Captain Cook National Park, W of Cape Everard Lighthouse, *A.C. Beaglehole 34488*, 10.xi.1970 (MEL); Ewing Marsh Wildlife Reserve, ± 10 km SW of Orbost P.O., *A.C. Beaglehole 68188*, 5.ii.1980 (MEL).

2e. *Senecio spathulatus* var. *attenuatus* I.Thomps., var. nov.

A varietate typica foliis attenuatioribus, indumento acheniorum densiore differt.

Type: New South Wales, Cronulla Recreation Reserve, *P.C. Heyligers 88108*, 8 July 1988; holo: CANB.

?*Senecio anacamptetrotis* DC., *Prodr.* 6: 374 (1838). *Type:* New South Wales, Port Jackson, [Sydney], *Fraser*; holo: G u.v. (photo seen CANB). [Possible synonymy based on appearance of photograph of type, but protologue is at odds with circumscription below.]

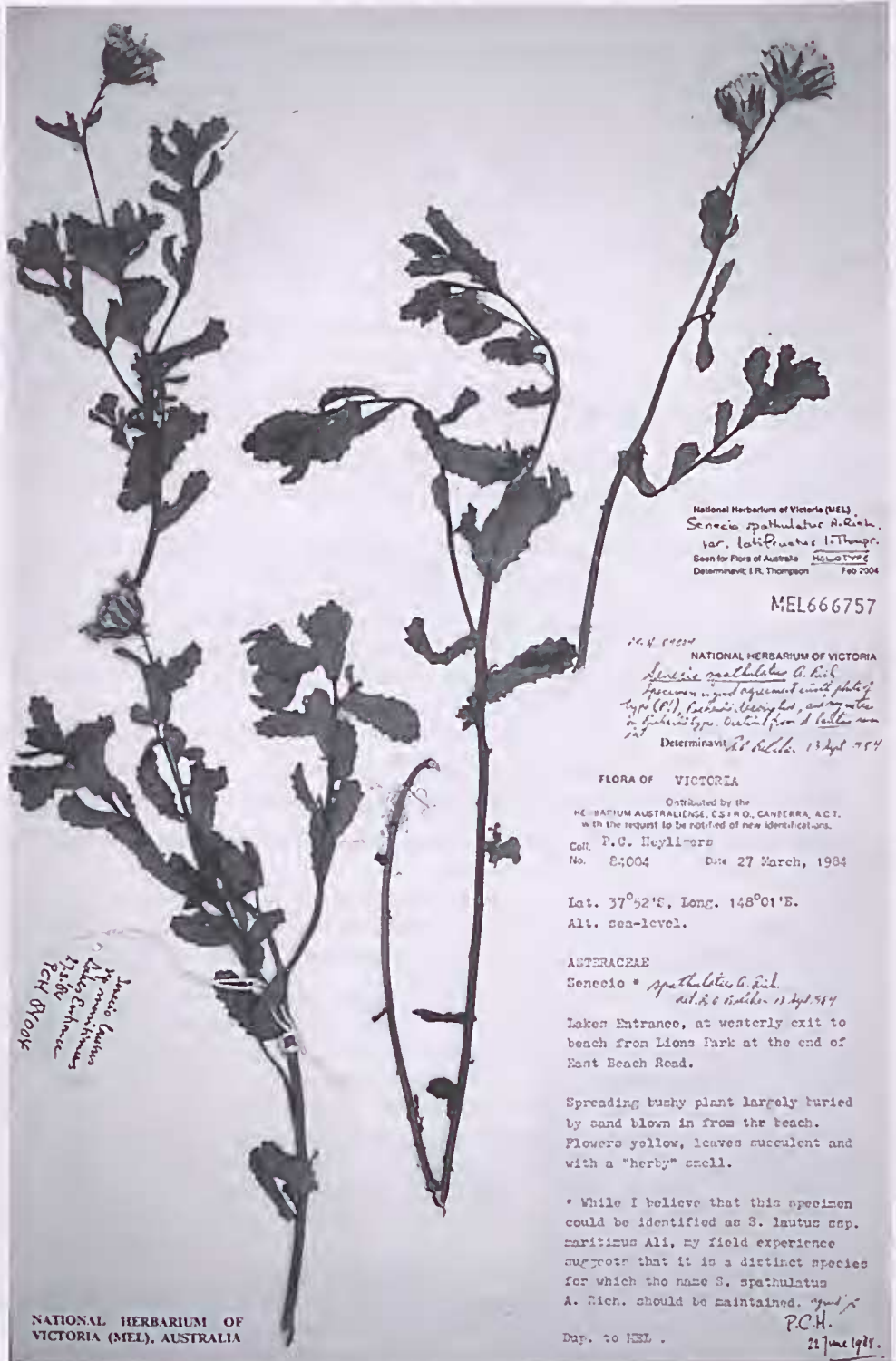
Leaves in mid-region of major branches usually tapering moderately basally. *Capitula:* involuere 6.0–10.0 mm long, 4.5–7 mm diam.; broadest stereomes 1.5–2.2 mm wide. *Achenes* 4.0–6.0 mm long, c. 0.5–0.7 mm diam., moderately narrowed at each end, light brown, with ribs obscured; papillose hairs in broad bands covering all or most of surface. *Pappus* longer than the achene, with bristles not fused basally.

Etyymology: The epithet refers to the more pronounced tapering of the leaves towards the base in this variety (*L. attenuatus*, attenuate).

Distribution and Habitat: Occurs on the east coast of New South Wales from Forster south to Jervis Bay (Fig. 3d).

Notes: This variety can be distinguished from coastal forms of *S. pinnatifolius* var. *pinnatifolius* by the fleshier leaves, larger capitula and longer, more densely hairy achenes.

Selected specimens examined: NEW SOUTH WALES: Kurnell, Botany Bay, *J.L. Boorman*, May 1906 (NSW); Mungo Beach, ENE of Mungo Brush, *A.N. Rodd 3734*, 11.ix.1981 (NSW); Wamberal Beach, *E. Cheel*, Apr. 1911 (NSW); Myall Lakes National Park, SE of Bombah Broadwater, Mungo Corner, *W. Greuter*, 2.ix.1988 (NSW); Quibray Bay, Kurnell, *L.A.S. Johnson*, 28.viii.1965 (NSW).



National Herbarium of Victoria (MEL)
Senecio spathulatus A. Rich.
 var. *latifructus* I. Thompson
 Seen for Flora of Australia
 Determinavit I.R. Thompson Feb 2004

MEL66757

26.4.1984
 NATIONAL HERBARIUM OF VICTORIA
Senecio spathulatus A. Rich.
 Specimen in good agreement with photo of
 type (P.), leaflets being lobed, and ray white
 in backside type. Material from 1 collection seen
 Determinavit I.R. Thompson 13 Sept 1984

FLORA OF VICTORIA

Contributed by the
 NATIONAL HERBARIUM OF VICTORIA, MELBOURNE, AUSTRALIA
 with the request to be notified of new identifications.
 Coll. P.C. Heyligers
 No. 84004 Date 27 March, 1984

Lat. 37°52'E, Long. 148°01'E.
 Alt. sea-level.

ASTERACEAE

Senecio = *spathulatus* A. Rich.
 det. S. G. Oliver 11 Sept 1984

Lakes Entrance, at westerly exit to
 beach from Lions Park at the end of
 East Beach Road.

Spreading bushy plant largely buried
 by sand blown in from the beach.
 Flowers yellow, leaves succulent and
 with a "herby" smell.

* While I believe that this specimen
 could be identified as *S. laevis* var.
maritimus All. my field experience
 suggests that it is a distinct species
 for which the name *S. spathulatus*
 A. Rich. should be maintained.

Dap. to MEL

P.C.H.
 21 June 1987

Senecio laevis
 var. *maritimus*
 17/8/84
 P.C.H.

NATIONAL HERBARIUM OF
 VICTORIA (MEL), AUSTRALIA

Figure 5. *S. spathulatus* var. *latifructus* (holo: P.C. Heyligers 84004 MEL).

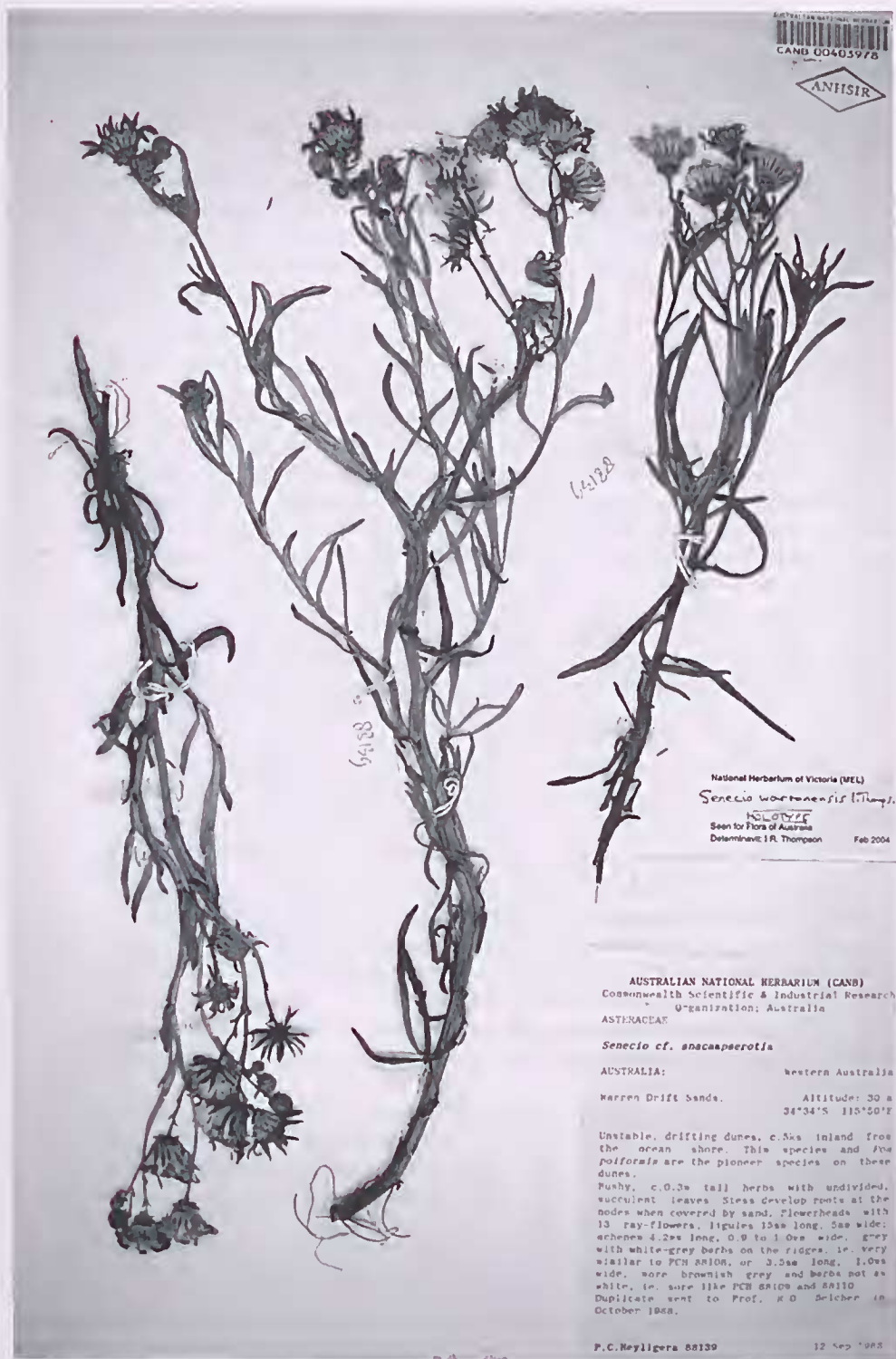


Figure 6. *S. warrenensis* (holo: P.C. Heyligers 88139 MEL).

AUSTRALIAN NATIONAL HERBARIUM (CAND)
 Commonwealth Scientific & Industrial Research
 Organisation: Australia
 ASTERACEAE

Senecio cf. spacaasperotia

AUSTRALIA: Western Australia
 Warren Drift Sands. Altitude: 30 m
 34°34'S 116°20'E

Unstable, drifting dunes, c. 5 km inland from
 the ocean shore. This species and *Poa*
poliformis are the pioneer species on these
 dunes.

Bushy, c. 0.3 m tall herbs with undivided,
 succulent leaves. Stems develop roots at the
 nodes when covered by sand. Flowerheads with
 13 ray-flowers, ligula 1.5 mm long, 5 mm wide;
 achenes 4.2 mm long, 0.9 to 1.0 mm wide, grey
 with white-grey beaks on the ridges, i.e. very
 similar to PCN 88108, or 3.5 mm long, 1.0 mm
 wide, more brownish grey and beaks not as
 white, i.e. more like PCN 88109 and 88110.
 Duplicate sent to Prof. G.O. Sclifer in
 October 1988.

P.C. Heyligers 88139 12 Sep 1985

3. *Senecio warrenensis* I.Thomps., *sp. nov.*

A *S. spatulato* A.Rieh. foliis angustioribus margine integerrimis, bracteolis latioribus imbricatus differt.

Type: Western Australia, Warren Drift Sands, *P.C. Heyligers 88139*, 12 Sep. 1988; *holo:* CANB.

Perennial to 0.3 m tall, sprawling to prostrate, largely glabrous. *Primary roots* not seen; roots arising from prostrate stems. *Leaves* in mid-region of stems or major branches 2–5 cm long, with marginal points 0–7 per side, divided or not, fleshy, drying thick and wrinkled; base commonly narrow; margin entire or denticulate; undivided leaves very narrow-elliptic or linear; divided leaves with 1–4 oblong to very narrow-oblong segments per side, average position more or less central. *Uppermost leaves* sometimes slightly lanceolate; base sometimes weakly stem-clasping. *Inflorescences* of 1–5 capitula; peduncle moderately hairy when developing, glabrescent. *Capitula:* calyicular bracteoles 12–18, imbricate at anthesis, broad-ovate to ovate, 2.5–4.5 mm long, 1.5–2.5 mm wide, with margin \pm glabrous; apex acute, pigmented purple in zone 0.5–1.0 mm long, and commonly extending down margin to form a chevron; involucre 7.0–9.0 mm long, c. 6–8 mm diam.; phyllaries c. 13, with apex pigmented purple; stereome fleshy, commonly drying pale yellow-green; resin ducts obscure; inner phyllaries: broader stereomes 1.3–2.0 mm wide; margin 0.1–0.4 mm wide, broadening to 0.5–1.0 mm wide in proximal two-thirds; outer phyllaries: margins vestigial or to 0.1 mm wide broadening to 0.3–0.5 mm wide in proximal two-thirds. *Florets* c. 80–100; ligulate florets c. 13, with ligule 8–15 mm long; corolla of disc florets 6–8 mm long. *Achenes* \pm homomorphic, c. 50% of length of phyllaries, 4.0–4.5 mm long, light brown, with ribs \pm flat; papillose-hairs moderately dense in bands obscuring most of surface, appressed to divergent, with l:w ratio 4–6; hairs of achenes of ray florets slightly exceeding pappus-ring. *Pappus* 5–8 mm long, possibly somewhat persistent. (Fig. 6)

Flowers recorded in September.

Etyymology: The epithet refers to the type locality near the Warren River.

Distribution and Habitat: Known only from the type locality c. 5 km inland from the coast and west of Northcliffe in far south-western Western Australia and from an old record further east at Esperance Bay (Fig. 3e). Grows on unstable, drifting dunes where it is a pioneering species with *Poa poiforuis*.

Notes: Although closest to *S. spatulatus* in terms of fleshiness of the leaves and size of capitula and achenes, *S. warrenensis* is reminiscent of *S. pinuatifolius* var. *latilobus* in terms of the relatively broad, overlapping, and chevronned calyicular bracteoles and the paler coloration of the phyllaries on drying.

Selected specimens examined: WESTERN AUSTRALIA: Warren drift sands, *P.C. Heyligers 88140*, 12.ix.1988 (CANB); Esperance Bay, *coll unknown*, date unknown (MEL 2168061).

4. *Senecio pinuatifolius* A.Rieh., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 117 (1834)

S. lautus f. *pinuatifolius* (A.Rieh.) Hochr., *Caudollea* 5: 336 (1934).

Type: Tasmania, D'Entrecasteaux Channel ['Detroit D'Entrecasteaux'], A. Lessou, 1828–29; *holo:* P.

Annual or perennial to 2.0 m tall, erect, sprawling or prostrate, sometimes rhizomatous (var. *alpinus*), largely glabrous. *Taproot* slender to stout; secondary roots usually fine throughout. *Leaves* in mid-region of stems or major branches 0.5–12 cm long, with marginal points 0–40 per side, divided or not, thin to fleshy, succulent on coast; base commonly narrow or attenuate, sometimes developing small basal segments; margin entire or dentate, serrate or denticulate; unsegmented leaves oblong to filamentous, narrow to very narrow-elliptic, or oblanceolate to narrow-oblanceolate; segmented leaves with 1–8

triangular or narrow-oblong to filamentous lobes or segments per side, with rachis to 5 mm wide, sometimes again divided, average position central to somewhat distal. *Uppermost leaves* sometimes lanceolate; base sometimes developing narrow segments or broad rounded auricles and mildly stem-clasping. *Inflorescences* of 1–40 capitula; peduncle sometimes somewhat hairy. *Capitula*: calycular bracteoles 6–16, imbricate or not at anthesis, lanceolate to broad-ovate, 0.5–3.5 mm long, 0.3–2.2 mm wide, with margin glabrous or variously hairy; apex subacute to acute, pigmented black, purple or light purple, with patch 0.2–1.2 mm long, sometimes chevronned; involuere 3.0–7.5 mm long, 2–5 mm diam.; phyllaries mostly c. 13, occasionally predominantly c. 20, with apex weakly to strongly pigmented brown, black or purple; stereome occasionally sparsely hairy, variably fleshy, sometimes succulent, drying dark or pale; resin ducts variably developed, pale to orange on drying or obscure; inner phyllaries: broader stereomes 0.8–1.5 mm wide, sometimes chevronned apically, margin 0.2–0.5 mm broadening to 0.4–0.8 mm wide proximally; outer phyllaries: margin vestigial or to 0.3 mm wide broadening to 0.1–0.5 mm wide proximally. *Florets* 30–100; ligulate florets 8–13, sometimes several fewer than phyllaries, with ligule 6–20 mm long; corolla of disc florets 3–7 mm long. *Achenes* ± homomorphic, 30–70% of length of phyllaries, (1.6–)2.0–4.5 mm long, golden, light to dark brown, olive or sometimes reddish (achenes of ray florets), with ribs often convex; papillose hairs sparse to moderately dense in bands obscuring up to 90% of surface, appressed to divergent, with l:w ratio 4–6, or achenes glabrous; hairs of achenes of ray florets exceeding pappus-ring or not. *Pappus* generally not persistent, 3–6 mm long.

Flowers mostly late winter to summer.

Notes: A highly variable species occurring mostly within c. 300 kilometres of the coast. It occurs predominantly in areas of moderate to high rainfall, but it does occur in arid or semiarid environments on the west and south coasts of Western Australia and the south coast of South Australia. The following infraspecific classification does not fully resolve the variation in *S. pinnatifolius*. Eight varieties of *S. pinnatifolius* are recognised here, with var. *pinnatifolius* containing a greater diversity of forms than the other varieties. The overall distribution of the species is presented in Fig. 16a.

Key to varieties of *Senecio pinnatifolius*

Leaves, unless otherwise indicated, refers to leaves in the middle third of stems and major branches. Proper examination of the phyllaries and bracteoles will generally require magnification. Inner phyllaries commonly alternate with outer phyllaries and the two types will often be placed side-by-side; however, intermediate phyllaries (see Terminology) are also frequent and need to be distinguished.

- 1 Leaves bi- or tri-pinnatisect; stems succulent; capitula and leaves rather crowded; ligules not or hardly longer than involuere in pressed specimens (Bass Strait islands)4c. var. *capillifolius*
- 1: Leaves undivided to pinnatisect or if rarely bipinnatisect, then stems not or hardly succulent; capitula and leaves crowded or lax; ligules generally distinctly longer than involuere in pressed specimens (widespread)
 - 2 Distal portion of stereome of inner phyllaries usually bordered by a purple chevron, more than twice as broad as stereome of outer phyllaries (both measured c. 1 mm below apex); margin of outer phyllaries c. as broad as stereome 1 mm below apex; tap-root generally poorly developed (southern Victoria and adjacent parts of South Australia and New South Wales, northern Tasmania, including Bass Strait Islands)4d. var. *lanceolatus*
 - 2: Distal portion of stereome of inner phyllaries not or occasionally faintly bordered by a purple chevron, generally less than twice as broad as stereome of outer phyllaries (both measured c. 1 mm below apex); margin of outer phyllaries narrower than stereome 1 mm below apex; tap-root often well-developed (widespread)

- 3 Calycular bracteoles 10–16, broad-ovate to ovate, >0.8 mm wide at mid-point and length less than twice the width at mid-point, largely hyaline; apex of stereome of inner phyllaries commonly with a fine chevron (far south-western Western Australia)4b. var. *latilobus*
- 3: Calycular bracteoles 6–12, ovate to lanecolate, either <0.8 mm wide at mid-point or length more than twice the width at mid-point, usually predominantly herbaceous; chevron generally absent (widespread)
- 4 Leaves thin, markedly discolorous; marginal points, mostly as serrulations, generally 15 or more per side; upper-branch leaves with base not narrower than mid-leaf (forests of northern New South Wales and southern Queensland)4e. var. *serratus*
- 4: Leaves usually somewhat fleshy and or succulent, not or only slightly discolorous; marginal points fewer than 15 per side, or if more then upper-branch leaves with base narrower than mid-leaf (widespread).
- 5 Plants rhizomatous or not, with aerial stems sometimes unbranched; leaves oblanceolate in outline and/or marginal points and segments clearly more numerous beyond mid-leaf; usually both peduncle and margin of calycular bracteoles moderately pubescent (montane to alpine regions).....4f. var. *alpinus*
- 5: Plants not rhizomatous, with stems generally branched; leaves not as above or if so then not peduncle and margin of bracteole not both pubescent
- 6 Leaves crowded, fleshy, 1–2 cm long; achenes c. 4 mm long, with surface completely obscured by hairs (Dempsters Inlet, southern Western Australia)4h. var. *leucocarpus*
- 6: Leaves various; achenes not entirely as above (distribution various)
- 7 Leaves generally only slightly fleshy, pressing fairly thin; leaves often developing straplike basal segments from a narrow rachis; rachis of upper-branch leaves generally narrower than stem at base; achenes to 4.5 mm long, usually e. half to two-thirds of the length of phyllaries4a. var. *pinatifolius*
- 7: Leaves fleshy, pressing thick, and often coarsely wrinkled; leaves not developing straplike basal segments from a narrow rachis; rachis of upper-branch leaves often as broad as or broader than stem at base; achenes to 3 mm long, generally less than half the length of phyllaries
- 8 Sprawling to prostrate plants; length:width ratio of rachis of leaves mostly 1–10; hairs of achenes of ray florets exceeding pappus-ring (southern coast, including western Tasmania) ...
.....4g. var. *maritimus*
- 8: Erect plants; length:width ratio of rachis of leaves 6–50; hairs of achenes of ray florets not exceeding pappus-ring (Western Australia).....4a. var. *pinatifolius*

4a. *Senecio pinatifolius* A.Rich. var. *pinatifolius*

The types of many of the following synonyms have not been seen or are deemed inadequate for identification. They are tentatively placed here as synonyms based on their provenance and on descriptions given in Beleher (1994).

?*S. gaudichaudianus* A.Rich., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 98 (1834). Type: Port Jackson, N.S.W., 1819, *Gaudichaud-Beaupré* 7; holo: P n.v., *vide* R.O. Beleher, *op. cit.* 84.

S. tripartitus A.Rich., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 114 (1834); *S. tripartitus* Steud., *Nom. Bot.* 2nd edn, 2: 566 (1840), *nom. illeg.* Type: Port Jackson,

New South Wales, 1828-29, A. Lesson; lecto: P *fide* R.O. Belcher, *op. cit.* 81.

S. crithmifolius A. Rieh., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 116 (1834), *nom illeg. non Scop.* (1772). T: 'Ile des Dangarous et Iles Steriles', Australia; holo: P *n.v.*, *fide* R.O. Belcher *op. cit.* 81, 84.

S. macquariensis DC., *Prodr.* 6: 372 (1838). Type: Banks of the Macquarie River, N.S.W., Apr. 1817, A. Cunningham 143; holo: G *n.v.*, *fide* R.O. Belcher, *op. cit.* 81 (1994).

S. endlicheri DC., *Prodr.* 6: 373 (1838), as *Endlicheri*. Type: New Hollandia [Australia], 1834, *Endlicher 1*; holo: G *n.v.*, *fide* R.O. Belcher, *op. cit.* 81.

S. oligocephalus DC., *Prodr.* 6: 373 (1838). Type: [probably] N.S.W., *Sieber*; G *n.v.*

S. lautus subsp. *dissectifolius* Ali, *Austral. J. Bot.* 17: 168 (1969), *pro parte excl. type*; G.J. Harden, *Fl. New South Wales* 3: 309 (1992)

S. lautus subsp. *maritimus* Ali, *Austral. J. Bot.* 17: 171 (1969), *pro parte excl. type*; G.J. Harden, *Fl. New South Wales* 3: 309 (1992).

Plants to c. 1.5 m tall, erect, sprawling or prostrate, with tap-root usually moderately to well-developed. *Leaves* in mid-region of stems and major branches 1.5–10 cm long, with marginal points 0–20 per side, divided or not, thin, fleshy or succulent; base attenuate or narrow, sometimes with basal segments or lobes; margin entire or teeth or denticulations sparse to frequent; undivided leaves oblanceolate, narrow-oblanceolate, linear or narrow-linear, with rachis 0.5–12 mm wide; pinnatisect leaves with 1–5 segments per side, with average position various; segments narrow-oblong to filamentous, entire or with a few denticulations, rarely lobed. *Uppermost leaves*: base remaining narrow or sometimes slightly dilated, with basal segments commonly developed. *Inflorescences* of 1–20 capitula; bract-axils with hairs inconspicuous; peduncle glabrous or occasionally with short, coarse hairs. *Capitulum*: calycular bracteoles 6–10, usually not imbricate at anthesis, ovate to narrow-ovate, 1.0–2.0(–2.5) mm long, 0.3–1.2 mm wide, with hyaline margin variably broad, glabrous or with generally weak hairs, pigmented light or dark purple apically or unpigmented, with patch c. 0.2–0.5 mm long; involucre 3.0–7.5 mm long, 2–5 mm diam.; phyllaries mostly c. 13 or mostly c. 20, rarely a minority of capitula in an inflorescence with fewer than 13; apex brown, black, purple or unpigmented; stercome slightly to moderately fleshy or succulent, drying yellow-green or brown; resin ducts commonly well-developed, orange, sometimes obscure; inner phyllaries: chevron typically absent; margin c. 0.1–0.2 mm wide 1 mm below apex broadening to 0.3–0.5 mm wide proximally; outer phyllaries: margin c. 0.1 mm wide distally widening to c. 0.2–0.4 mm wide proximally. *Ray florets* 8–13, as numerous as or fewer than phyllaries. *Achenes* 2.0–4.5 mm long, generally c. 40–70% of length of phyllaries, olive-brown, brown or golden; ray achenes sometimes reddish, with papillose-hairs in narrow or broad bands, or achenes glabrous; hairs of achenes of ray florets mostly not exceeding pappus-ring. (Fig. 8)

Distribution and Habitat: Occurs in eastern and western Australia mostly within 400 km of the coast. In eastern Australia it extends from Rodd's Peninsula in south-eastern Queensland south through eastern New South Wales to eastern Victoria; in South Australia it occurs in the Mount Lofty Ranges in the south-east, and in Tasmania it is widespread. In Western Australia it occurs around Carnarvon and in the far south-west from Mt Yetar east of Perth south-south-east to Bremer Bay and further east around Cape Arid. There are isolated records in south-central and south-western Victoria at Wilsons Promontory and Portland (Fig. 7a). Grows in a range of environments, including dry hills and coastal dunes, in forest, woodland and scrubland.

Notes: This variety represents a complex of subtly different forms that currently resist discrimination. Although morphologically similar, it is uncertain whether eastern and western forms are closely related. The following forms are generally the most readily recognisable and have been well-collected.

In the Carnarvon district on the west coast of Western Australia, plants have a long, slender taproot, a lower stem that develops a silvery bark, relatively large capitula, small bracteoles, and relatively short achenes.

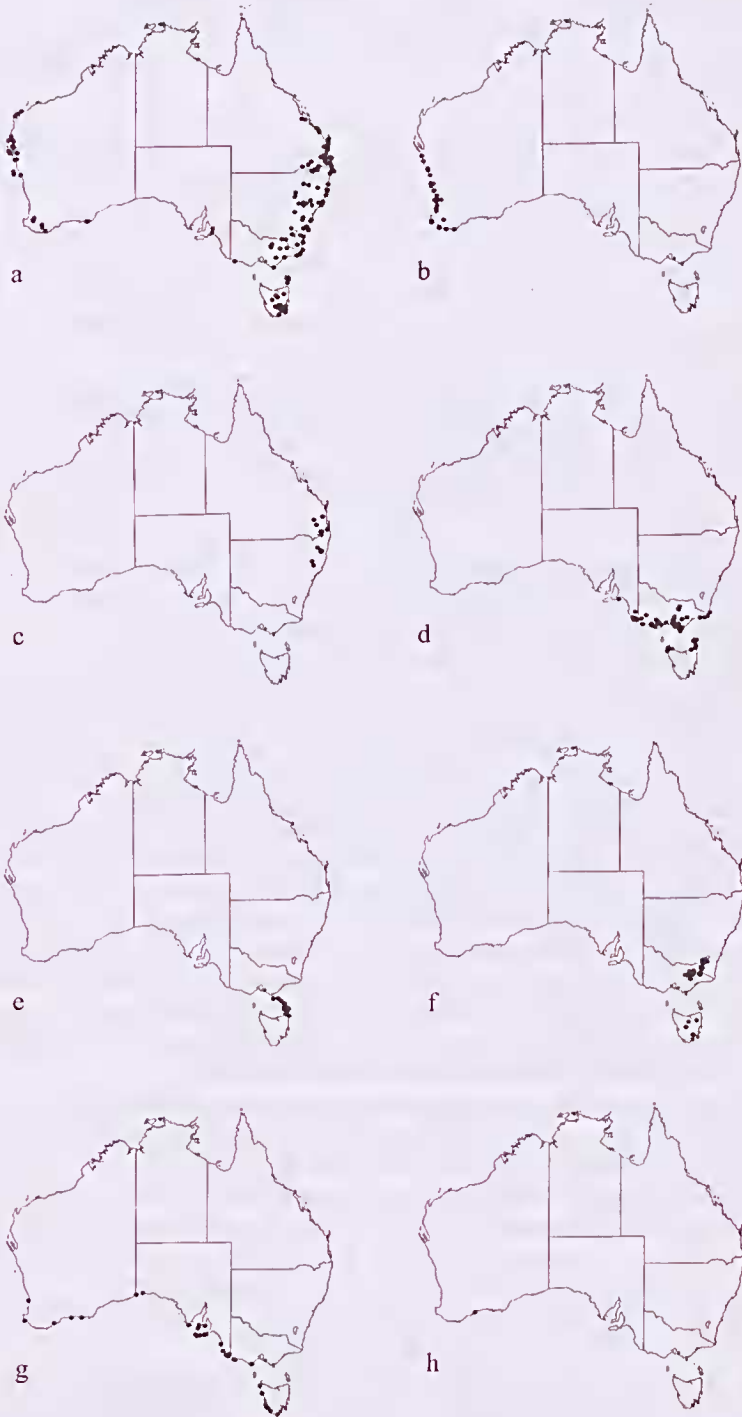


Figure 7. Distribution of varieties of *Senecio pinnatifolius*: a. var. *pinnatifolius*; b. var. *latilobus*; c. var. *serratus*; d. var. *lanceolatus*; e. var. *capillifolius*; f. var. *alpinus*; g. var. *maritimus*; h. var. *leucocarpus*.



Figure 8. *S. pinnatifolius* var. *pinnatifolius* (holo: A. Lesson P).

A form from drier inland parts of central-eastern and north-eastern New South Wales and south-eastern Queensland has very narrow, often filamentous leaf segments, relatively few, small capitula and often has capitula with c. 20 phyllaries. This form is similar to *S. spanouerus*; however, the latter has leaves with a broader rachis and segments and leaves do not develop narrow basal segments from a narrow base, its inflorescences have more capitula, the capitula are slightly larger, and calyular bracteoles are longer and often with coarse white hairs on the margins. A similar form occurs in woodlands east and south-east of Perth in south-western Western Australia. In north-eastern Victoria, another form of var. *pinuatifolius* with filamentous leaf segments commonly has relatively large capitula with c. 20 phyllaries.

A widespread form (recognised as *S. lautus* subsp. *maritimus sensu* G.J. Harden in Flora of New South Wales vol. 3, 1992) extending along the coasts of southern Queensland, New South Wales and eastern Tasmania has somewhat succulent leaves and the rachis is usually narrowly oblanceolate. Achenes are typically relatively long and slender, extending more than half the length of the phyllaries. This form is referable to *S. tripartitus* A.Rich. Compared to *S. pinuatifolius* var. *maritimus*, which occurs on the southern mainland coastline, its leaves are less fleshy, narrower basally, with generally more marginal points, and often with slender basal segments, and its achenes are distinctly longer and relatively slender, with finer, shorter hairs in narrower grooves.

Much of the material from Queensland, New South Wales and Tasmania until recently identified as *S. lautus* subsp. *dissectifolius* or *S. lautus* subsp. *maritimus* is *S. pinuatifolius* var. *pinuatifolius*.

A few collections assigned to var. *pinuatifolius* from the Cape Arid region and Mondrain Island in the Reeherehe Archipelago in southern Western Australia are tall perennials (to 1.5 m tall). Further collections from this area are desirable.

Selected specimens examined: WESTERN AUSTRALIA: 2 km E of Miaboola Beach, about 10 km N of Carnarvon, *R. Story* 8225, 9.ix.1976 (MEL, PERTH); Sand-dunes at Point Quobba, *P.S. Short* 2052, 14.x.1983 (MEL, PERTH); Monkey Mia, *P.S. Short* 2466, *N.S. Lauder*, & *B.A. Fuhrer*, 16.viii.1986 (AD, MEL, PERTH); Site 12, off Yarra Road, 4.8 km NW of Mount Yetar, *M.G. Allen* 58, 5.xi.1996 (PERTH). QUEENSLAND: E-most point of North Stradbroke Island, Point Lookout headland, near the township of Point Lookout, *I. Radford s.n.*, 8.ix.1993 (BRI, CANB, NSW) c. 10 km W of Warwick on Cunningham highway, then 1 km from turnoff towards Goondiwindi, field on left side of road, *I.J. Radford s.n.*, 15.ix.1993 (BRI, CANB); E of 'Fair Hills' SW of Cooyar, *A.R. Bean* 10599, 24.viii.1996 (BRI); Beside rough track above White Cedar Picnic Area Northbrook Parkway, *S.P. Phillips* 224, 12.vi.1999 (BRI); Enoggera, *F.M. Bailey* (BRI); 5 miles [8 km] N of Toobeah, *L. Pedley* 786, 27.vi.1961 (BRI, MEL); Sianthorpe, 5 km from PO, end of Nelson Cres., off the road to Texas, *L.W. Cayzer* 828, *S. Donaldson*, & *S. Pedersen*, 18.v.1999 (CANB); Darling Downs District, Glen Aplin, *S.L. Everist* & *L.J. Webb* 1346, 22.xi.1946 (BRI, CANB); SW of Mt Nebo, D'Aguilar Range, *I.R. Telford* 693, 21.v.1969 (CANB); W slopes of Mt Mermaid, NW of Brookfield, *I.R. Telford* 1595, 13.v.1970 (CANB). NEW SOUTH WALES: Back Beach, Trial Bay, *P.C. Heyligers* 85032, 1.xii.1985 (CANB); Hat Head National Park, near Hat Head township, *K. McDougall* 805 & *R. McDougall*, 15.vii.2000 (MEL); Tacking Point, Port Macquarie, *A. Maguire* 1, 30.iv.1993 (CANB, MEL, NSW, UNE); S Coast: ca. 3 km N of Bermagui, *L.G. Adams* 3188, 12.iv.1973 (CANB); Sand dunes between Tuncurry Beach Caravan Park and sea, *J.R. Hosking* 739 & *R. Hohkamp*, 20.iv.1993 (CANB, MEL, NE, NSW); Evans Head, *M.E. Phillips s.n.*, 18.viii.1963 (CANB); Jervis Bay National Park, Steamers Beach, *N.M. Taws* 636, 11.x.1996 (CANB); Baragoot Beach, *P.C. Heyligers* 85009, 31.viii.1985 (CANB); 5 km N of Moruya, on coast adjacent to aircraft runway, *I. Radford s.n.* & *D. King*, Sept. 1992 (AD, BRI, HO, MEL, NE, NSW, PERTH); Mt Kaputar National Park, c. 10 km from Visitors Information Centre along Narrabri to Mt Kaputar road, *P.S. Short* 3945, *K. Watanabe*, *T. Yahara*, *T. Denda* & *Y. Suzuki*, 28 Jan 1993 (AD, CANB, DNA, MEL, NSW); 34.3 km from Narrabri toward Mt Kaputar, *B. Muffet* M3/84, 24.viii.1974 (CANB); Bulga CR, 16 miles [25 km] from Singleton on Putty Road, *D.W. Shoobridge*, 27.vii.1961 (CANB); Warrumbungles National Park, *C.R. Dunlop* CRD610, 21.viii.1969 (CANB); North west of Woodsreef mine alongside road near Ironbark Creek, *J.R. Hosking* 524, 27 Aug. 1992 (CANB, MEL, NE, NSW); White Box Camp, in Goulburn River National Park, off Bylong-Merriwa Road,

S.M. Prober s.n., 4.ix.1990 (CANB); 3.8 km E of Yetman on Bruxner Highway, *C.W.E. Moore* 9300, 19.x.1992 (CANB); Split Rock, 24 km NW of Coonabarabran, *H.S. Sreimann* 675, 9.xii.1973 (CANB, NSW); c. 50 km (direct) E of Forbes, Eugowra-Cudal Road, W of Cudal just before Murga Sawmill, *R. Consens s.n.*, Sep. 1992 (CANB, NSW). **VICTORIA**: Extreme north-eastern face of Pine Mtn, approx. 12 km from Walwa, *L. Wheeler* 199, 6.xii.1975 (CANB); Blue Range Reference Area, Mount Samaria State Park, *A.C. Beanglehole* 91090 & *N.T. Rossiter*, 7.xi.1987 (MEL); About 19 km ESE of Benalla. Just E of Greens Road, about 4 km S of Upper Lurg, *H.J. Aston* 2571, 26.x.1985 (MEL); Croajingolong National Park, near mouth of Seal Creek, *D.E. Albrecht* 4852, 22.x.1991 (AD, CANB, MEL); Shell Beach, Bridgewater Bay, near Portland, *R. Melville* 1489, *C. Beanglehole*, *P. Finck* & *E. Finck*, 11.x.1952 (MEL). **TASMANIA**: Bedlam Walls, A. Moscal 16605, 9.x.1988 (HO); Grasstree Hill Road, 'saddle', *A.M. Gray* 945, 6.iv.1999 (HO); Blackman's Bay, *J. Somerville*, 15.viii.1933 (HO); South Ridge of Mt Hobbs, *P. Collier* 2021, 14.xii.1986 (HO); Roaring Beach Bay, Tasman Peninsula, *A.E. Orchard* 5239, 15.i.1981 (AD, HO, MEL, NSW); Near Hope Beach, on cliffs above Black Jack light, *M.E. Phillips* 379, 8.xi.1960 (CANB); Ile du Golfe, *C.G. Short*, 21.i.1987 (HO); Flat Top Island, *N. Brothers s.n.*, 3.xi.1983 (HO); Maatsuyker Island, *P. Blackwell s.n.*, 1977 (HO); Gull Reef, Port Davey, *M. Allan s.n.*, 24.i.1977 (HO)..

4b. *Senecio pinnatifolius* var. *latilobus* (Steetz) I.Thomps., *comb. nov.*

S. carnulentus var. *latilobus* Steetz, in J.G.C. Lehmann, *Pl. Preiss.* 1: 485 (1845), as *latiloba*.

Type: Western Australia, near Perth ['in arenosis subumbrosis sylvae ad lacun Dunjambur, prope oppidulum Perth'], *L. Preiss* 110, 16 July 1839; lecto: *W.n.v.*, *fide* R.O. Belcher, *Austral. Syst. Bot.* 7: 77 (1994); isolecto: MEL.

S. carnulentus var. *angustissimus* Steetz, in J.G.C. Lehmann, *Pl. Preiss.* 1: 485 (1845), as *angustissima*. *Type*: Western Australia, Rottneest Island ['in arenosis insulae Rottneest'], *L. Preiss* 109, 20 Aug. 1839; lecto: MEL, *fide* R.O. Belcher, *Austral. Syst. Bot.* 7: 77 (1994).

Plants to 0.6 m tall, erect, often taller than broad, with tap-root well-developed. *Leaves* in mid-region of stems and major branches 3–10 cm long, with marginal points 2–12 per side, usually divided, thin to subfleshy; base usually narrow, with segments not developed; margin entire, denticulate or serrate; undivided leaves narrow-elliptic or narrow-linear, with rachis 0.5–12 mm wide; divided leaves with up to 4 narrow-oblong to linear segments per side. *Uppermost leaves*: base sometimes dilated and slightly stem-clasping, sometimes with segments developed. *Inflorescences* of 3–20 capitula; bract-axils often with conspicuous hairs; peduncles glabrous or nearly so. *Capitula*: calycular bracteoles 10–16, sometimes imbricate at anthesis, ovate to broad-ovate, 1.5–3 mm long, 0.8–2.2 mm wide, glabrous or less often with coarse hairs, pigmented usually purple or brown apically, sometimes with chevron; involucre 3.5–5.5(–6.5) mm long, 3–4 mm diam.; phyllaries predominantly c. 13, with apex pale brown or purple; stereome slightly fleshy, drying green or yellow-green; resin ducts usually indistinct, pale; inner phyllaries: chevron often present, fine; margin c. 0.2 mm wide 1 mm below apex broadening to 0.3–0.5 mm wide proximally; outer phyllaries: margin c. 0.1 mm wide 1 mm below apex broadening to c. 0.2 mm wide proximally. *Ray florets* mostly c. 13, c. equal to number of phyllaries. *Achenes* 2.0–3.0 mm long, generally c. 40–50% of length of phyllaries, with papillose hairs in broad bands obscuring most of surface; hairs of achenes of ray florets not exceeding pappus-ring. (Fig. 9)

Distribution and Habitat: Occurs in south-western Western Australia on or near the coast and on nearby islands, from Geraldton south to the far south-west corner and from there extending east as far as Albany (Fig. 7b).

Notes: This variety is characterised by the numerous, relatively broad and largely hyaline calycular bracteoles, and to a lesser extent by its erect habit, well-developed taproot, and the fine chevron often outlining the stereome of the inner phyllaries. The calycular bracteoles, because of their number and width, are frequently imbricate at anthesis. The chevron of var. *latilobus* is more acute than that of var. *lanceolatus* because



Figure 9. *S. pinnatifolius* var. *latilobus* (A.M. James 2 PERTH).

the stereome of the former tapers more distally. The pinnatisect form of this variety is the commonest form. Although having larger bracteoles, it is otherwise very similar to the form of *S. pinnatifolius* var. *pinnatifolius* that occurs north of Geraldton, and the two taxa appear to intergrade where their distributions overlap. Another form occurs predominantly on islands off the west coast of Western Australia in guano-rich environments. It is more succulent than the typical form, and commonly has narrow-elliptic leaves with a broad rachis and serrulate margins, and relatively congested capitula.

Selected specimens examined: WESTERN AUSTRALIA: Spearwood, *B.J. Grieve*, 18.x.1953 (PERTH); Yanehep National Park between Gloucester Lodge and Main Road, *A.M. James* 217, Oct. 1963 (PERTH); City Beach, Perth, *T.E.H. Aplin* 988, 5.ix.1961 (MEL, PERTH); Mullaloo Beach Road, *H. Demarz* 2727, 21.x.1970 (CANB, PERTH); Fortview Road, Swanbourne, *R.J. Cranfield* 378, 24.viii.1978 (CANB, PERTH); Western slope of Reabold Hill, Floreat Park, *J. D'Alonzo* 93, 29.viii.1985 (CANB, PERTH); Denmark Shire, Bibbulum Track c. 1.5 km east from Lights Beach carpark, *B.G. Hammersley* 1828, 31.x.1997 (PERTH); 3 miles [5 km] east of Jurien Bay (ca. 126 miles [170 km] direct) NNW of Perth, *R.V. Smith* 66/172, 1.ix.1979 (MEL); Green Island, off Rottnest Island, *E. Rippey* 136, 6.ix.1999 (PERTH).

4c. *Senecio pinnatifolius* var. *serratus* I.Thomps., var. nov.

A varietate typica foliis tenuioribus lamina latiore dentibus pluribus differt.

Type: Queensland, Acacia Plateau, *L.J. Webb* 2464, 5 Mar. 1951; holo: CANB.

S. lantus subsp. *lanceolatus* (Benth.) Ali, *Austral. J. Bot.* 17: 173 (1969), *pro parte* excl. type; G.J. Harden, *Fl. New South Wales* 3: 309 (1992), *pro parte* excl. type.

Plants to c. 1 m tall, typically erect, with tap-root moderately developed. *Leaves* in mid-region of stems and major branches 5–15 cm long, with marginal points 10–30 per side, divided or not, thin on drying; base attenuate to cuneate; margin serrate, serrulate or denticulate; undivided leaves narrow-elliptic, with rachis 5–30 mm wide; divided leaves with 1–3 narrow-oblong to linear segments per side. *Uppermost leaves* becoming narrow-oblong to lanceolate upwards; base truncate to cordate and weakly stem-clasping. *Inflorescences* of 3–20 capitula; bract-axils with hairs inconspicuous or moderately developed; peduncles glabrous or with scattered coarse hairs. *Capitulum:* calycular bracteoles 6–10, usually not imbricate at anthesis, narrow-ovate to lanceolate, 1.5–2.5 mm long, 0.8–1.3 mm wide, margin glabrous or with weak hairs, pigmented dark purple apically, with mark c. 0.5–1.0 mm long; involuere 4.0–6.0 mm long, 3–4 mm diam.; phyllaries c. 13, with apex black or dark purple; stereome slightly fleshy, drying olive-green to bronze; resin ducts well-developed; inner phyllaries: chevron absent; margin c. 0.2–0.3 mm wide 1 mm below apex broadening gradually to 0.3–0.5 mm wide proximally; outer phyllaries: margin vestigial to 0.1 mm wide 1 mm below apex broadening to 0.1–0.2 mm wide proximally. *Ray florets* 8–13, c. equal to or fewer than phyllaries. *Achenes* 2.5–3.2 mm long, generally c. 50–60% of length of phyllaries, olive-brown, brown or blackish-brown, with papillose hairs confined to grooves, or achenes glabrous; hairs of achenes of ray florets not exceeding pappus-ring. (Fig. 10)

Etymology: The epithet alludes to the margin of the leaves (*L. serratus*, serrate)

Distribution and Habitat: Occurs in south-eastern Queensland south from the Bunya Mountains and in north-eastern to central-eastern New South Wales as far south as Barrington Tops (Fig. 7e). Grows in forests, often at margins of rainforest, and sometimes in cleared areas.

Notes: The leaf morphology of var. *serratus* is similar to that of var. *lanceolatus*. However, the former has different phyllary morphology and its inflorescences generally have fewer capitula. Var. *serratus* is also similar to var. *alpinus* but the leaves differ in the shape and in the position of marginal points. In Barrington Tops, the leaves of this variety are generally less conspicuously serrulate than in populations further north.



Figure 10. *S. pinnatifolius* var. *serratus* (holo: L.J. Webb CANB).

Selected specimens examined: QUEENSLAND: Great Dividing Range E of Warwiek, a few km W of Queen Mary Falls on the road from Killarney, roadside, *I. Radford s.n.*, 15.ix.1993 (BRI, CANB); O'Reilly's, Lamington National Park, *L.S. Smith & L.J. Webb 3586*, 10.v.1948 (BRI, CANB); Bunya Mountains, *M.E. Phillips s.n.*, 5.vi.1961 (CANB); Mt Gipps, *C.T. White 12081*, 11.iv.1941 (BRI, CANB). NEW SOUTH WALES: Glen Elgin, *J.W. Haney s.n.*, 15.iv.1930 (CANB); Northern Tablelands, New England National Park, Darkie Point, *P. Gilmour 7085*, 14.v.1990 (CANB, NSW); Northern Tablelands: Barrington Tops, Carey's Peak, *I.R. Telford 2730A*, 12.ii.1971 (CANB).

4d. *Senecio pinnatifolius* var. *lanceolatus* (Benth.) I.Thomps., *coub. nov.*

S. lautus var. *lanceolatus* Benth., *Fl. Austral.* 3: 667 (1867); *S. lautus* subsp. *lanceolatus* (Benth.) Ali, *Austral. J. Bot.* 17: 173 (1969).

Type: Victoria, Port Phillip, *Adausou*; lecto: K, photo seen CANB [The lectotype was presumably chosen by Ali but this is not explicitly stated in his paper]; Port Philip, *R.C. Gunn s.n.*; syn: K, photo seen CANB.

S. pinnatifolius var. 3 *sensu* N.G. Walsh, *Fl. Victoria* 4: 949 (1999).

S. pinnatifolius var. *pinnatifolius sensu* N.G. Walsh, *Fl. Victoria* 4: 948 (1999), *pro parte*.

S. pinnatifolius var. 2 *sensu* N.G. Walsh, *Fl. Victoria* 4: 948 (1999), *pro parte*.

Plants to 1.5(–2) m tall, commonly erect, sometimes sprawling, with tap-root poorly developed. *Leaves* in mid-region of stems and major branches 3–15 cm long, with marginal points 8–40 per side, divided or not, thin to subfleshy, or succulent on coast; base attenuate, without segments; margin variously toothed, the teeth often somewhat crowded antrorse and elongate; undivided leaves narrow-oblongate, narrow to very narrow-elliptic, or ± linear, rachis 2–30 mm wide; divided leaves with (1–)2–7 lanceolate, narrow-oblong, or c. linear segments per side, average position c. midleaf, sometimes again divided. *Uppermost leaves* narrow-oblong, ovate or lanceolate; base often cordate, stem-clasping, with segments often developed. *Inflorescences* of 3–40 capitula; bract-axils often with long coarse hairs; peduncles glabrous or with long hairs. *Capitulum:* calycular bracteoles 6–14, imbricate or not at anthesis, ovate to narrow-ovate, 2.0–3.5 mm long, 0.8–1.6 mm wide, with margin often coarse-hairy, usually pigmented dark purple apically, with mark c. 0.5 mm long, sometimes chevronned; involucre 4.0–7.0 mm long, 3–6 mm diam.; phyllaries mostly c. 13, with apex purple; stereome slightly fleshy, drying dark-green or brown, succulent in coastal plants; resin ducts indistinct, pale; inner phyllaries: chevron usually well-developed, to 1.5 mm long, sometimes notched, outlining the distally relatively broad and partially pale (on drying) stereome; margin c. 0.25–0.4 mm wide 1 mm below apex broadening to 0.3–0.6 mm wide proximally; outer phyllaries: margin c. 0.2 mm wide 1 mm below apex broadening to c. 0.3 mm wide proximally. *Ray florets* c. 13, c. equal to phyllaries. *Achenes* (1.6–)2.0–3.2 mm long, generally c. 40–50% of length of phyllaries, brown, coppery-brown or green, with papillose hairs in narrow to broad bands, or achenes glabrous; hairs of achenes of ray florets exceeding pappus-ring or not. (Fig. 11)

Distribution and Habitat: Occurs in far south-eastern South Australia, throughout southern Victoria, in far south-eastern New South Wales, and in northern Tasmania including islands in Bass Strait (Fig. 7d). Grows in forest, woodland and shrubland in lowland to hilly environments.

Notes: This variety differs from the other varieties most significantly in phyllary morphology, in particular in having inner phyllaries marked with a purple chevron, the relatively large disparity in width between the stereomes of the inner and outer phyllaries (measured c. 1 mm below the apex); and the relatively broad hyaline margin distally of the outer phyllary (compare Figs 2a and 2c). Also in this variety the leaves tend to have a relatively high number of marginal points, the number of capitula per inflorescence is often high, and the taproot poorly developed. The chevron in var. *lanceolatus* is often just



Figure 11. *S. pinnatifolius* var. *lanceolatus* (P.C. Jobson 4002 MEL).

discernible with the naked eye. In dried specimens, the relatively broad distal portion of the stereome that the chevron outlines is green centrally, but there is usually a pale zone between this green portion and the chevron (Fig. 2a).

As is typical of lautusoid taxa, the degree of leaf division can vary enormously in some populations (Fig. 1c). On the other hand, populations of purely serrate-leaved plants (Fig. 1f) or purely pinnatisect-leaved plants also occur.

A few forms of var. *lanceolatus* have been identified. A form from south-western Victoria and adjacent parts of south-eastern South Australia has relatively small capitula. Relatively robust forms occur in basaltic areas of south-western Victoria often growing at lake margins and in higher rainfall areas east of Melbourne, and these generally have glabrous or sparsely hairy achenes. A coastal form, e.g. from Cape Schanck in southern Victoria, has leaves with a relatively low length:width ratio.

Plants of var. *lanceolatus* growing on coastal dunes have smaller more succulent leaves with reduced numbers of marginal points; these were identified as *S. pinnatifolius* var. 2 by Walsh (1999).

Selected specimens examined: SOUTH AUSTRALIA: State Forest, National Trust Lease, adjacent to western side of Lower Glenelg National Park, *J.Z. Weber* 7783, 24.x.1982 (AD); The Bluff, Tantoola, *R.J. Bates* 26317, 24.xi.1991 (AD); Myponga to Victor Harbour Swamps, in shaded area in deep gully toward Spring Mt., *R. Bates* 3554, 22.xii.1983 (AD). NEW SOUTH WALES: South Coast: Nadgee Nature Reserve; Nadgee Lake, *P. Gilmour* N26, 6.x.1982 (CANB); Wonboyn Beach, *M.E. Phillips*, 9.x.1961 (CANB); South Coast near the mouth of Saltwater Ck, south of Eden, *D.E. Albrecht* 722, 16.ix.1984 (MEL, NSW). VICTORIA: Grampians. Mt Dundas, c. 25 km NE of Cavendish, *P.C. Jobson* 3931, *I.C. Clarke, J.E. Tonkin, & N.O. Wallace*, 26.x.1995 (BRI, CANB, MEL); Mt Richmond National Park, far south east corner of Park (21 km north west of Portland), *R.V. Smith* 671122, 15.x.1967 (AD, CANB, HO, MEL, NSW); South-west. Framlingham Forest, ca. 20 km NE of Warrnambool, *M.G. Corrick* 7929, 18.xii.1981 (AD, CANB, MEL, NSW); Glenmaggie Flora Reserve, *A.C. Beanglehole* 78491, 19.x.1984 (MEL); Waratah Bay, young sand dunes at the mouth of shallow inlet, *P.C. Heyligers* 81015, 20.xi.1981 (CANB, MEL); 11.5 km NW of Foster on road to Meenyan, *M.E. Lawrence* 1093, 3.xii.1978 (AD). TASMANIA: Anthony Beach, Smithton, *D.I. Morris* 79146, 12.vii.1979 (HO); Small group of three islands off NW tip of Preservation Island, *S. Harris*, 28.xi.1986 (HO); Chalky Island off central W coast of Flinders Island, *S. Harris*, 10.xii.1986 (HO); Forsyth Island, Furmeaux Group, *J.S. Whinray & A. Piesse* (CANB); Blackmans Lagoon, *A. Moscal* 4549, 27.xi.1983 (CANB, HO).

4e. *Senecio pinnatifolius* var. *capillifolius* (Hook.f.) I.Thomps., *comb. nov.*

S. capillifolius Hook.f., *Hooker's London J. Bot.* 6: 123 (1847); *S. laetus* var. *capillifolius* (Hook.f.) F.Muell., *Contributions to the Phytogeography of Tasmania* (1876), *nou. und., nom. inval.*

Type: Tasmania [V.D.L.], *R.C. Gum* 705; holo: K. photo seen MEL.

Plants to c. 0.8 m tall, erect or sprawling, with tap-root moderately or well-developed. *Leaves* in mid-region of stems and major branches mostly 2–10 cm long, with marginal points 6–40 per side, bi- or tri-pinnatisect, slightly fleshy and succulent; base commonly narrow, sometimes attenuate; margin generally entire; divided leaves with 2–7 variously-shaped segments per side, with average position more or less central. *Uppermost leaves:* base sometimes slightly dilated, sometimes developing segments. *Inflorescences* of 3–15 capitula; bract-axils generally inconspicuously hairy, sometimes conspicuously; peduncle glabrous or transiently pubescent. *Capitulum:* calycular bracteoles 8–12, not imbricate at anthesis, narrow-ovate to lanceolate, 1.5–3.0 mm long, 0.7–1.2 mm wide, with margin ± glabrous or with weak hairs, pigmented purple apically, with patch c. 0.5 mm long; involucre 4.0–7.0 mm long, 3–6 mm diam., glabrous; phyllaries c. 13 or occasionally c. 20, with apex purple or hardly pigmented; stereome fleshy, often succulent, drying brown or blackish-brown; resin ducts moderately distinct, pale to orange; inner phyllaries: chevron not developed, margin 0.2–0.3 mm wide 1 mm below apex broadening to c.

0.3–0.4 mm wide proximally; outer phyllaries: margin c. 0.1 mm wide 1 mm below apex broadening to 0.2 mm wide proximally. *Ray florets* c. 13, equal to or fewer than phyllaries. *Achenes* 2.0–3.0 mm long, 30–40% of length of phyllaries, brown, with papillose hairs in broad bands; hairs of achenes of ray florets exceeding pappus-ring. (Fig. 12)

Distribution and Habitat: Occurs on islands of Bass Strait, notably the Furneaux and Kent group (Fig. 7e). Grows in often rocky environments on or near the coast.

Notes: This variety is characterised by succulent branches (generally quite flattened after pressing), congested corymbiform inflorescences that are held only a short distance above the often congested upper-branch leaves, ligules not or hardly longer than the involucre, and relatively short achenes. There are two distinct extremes of leaf forms but there are also numerous specimens of an intermediate nature. The type specimen has leaves with long, filiform primary and secondary segments, whereas another form has smaller intricately divided often tri-pinnatisect leaves with segments rather crowded (this latter form is shown in Fig. 12). This variety and var. *pinuatifolius* are the two varieties of *S. pinuatifolius* to develop capitula with c. 20 phyllaries. Forms of var. *lauceolatus* with bi-pinnatisect leaves, some of which occur on Bass Strait Islands, resemble var. *capillifolius* but these forms have inner phyllaries with chevron markings, inflorescences and especially leaves are less congested and the ligules are longer than the involucre.

Selected specimens examined: TASMANIA: Sea Lion Island, Near S Western point, *J.S. Whinray 8759* (MEL); Furneaux Group; Craggy Island, *J.S. Whinray 311*, 6.xi.1972 (HO); Great Dog Island, *M. Christie*, Dec. 1971 (HO, MEL); North East Island, Kent Group, *N.P. Brothers s.n.*, 15.vii.1981 (HO); Round Islet, Hogan Group, *N.P. Brothers 85*, 15.xi.1983 (HO); Big Dog Island, Furneaux Group, *J.S. Whinray 189*, 6.ix.1972 (CANB); Boxen Island, Western slope of summit, *J.S. Whinray 8723* (AD, CANB, HO, MEL); Spike Island, *S. Harris*, 26.xi.1986 (HO); Beagle Island, *S. Harris*, 28.xi.1986 (HO); North Middle Pasco Island, Pasco Group, off W coast of Flinders Island, *S. Harris*, 14.xii.1986 (HO); Little Chalky Island, *A.M. Buchanau 11210*, 14.xii.1988 (HO, MEL); Little Chalky Island, Furneaux Group, North Coast, *J.S. Whinray 1465*, 6.iii.1978 (CANB).

4f. *Seuocio pinuatifolius* var. *alpinus* (Ali) I.Thomps., *stat. et comb. nov.*

S. laetus subsp. *alpinus* Ali, *Austral. J. Bot.* 17: 167 (1969); J.H. Willis, *Haudb. Pl. Victoria* 2: 751 (1972); G.J. Harden, *Fl. New South Wales* 3: 308 (1992).

Type: Victoria, Mt Buffalo National Park, on SW margin of Lake Catani, c. 4500 ft, 21 Feb. 1963, *J.H. Willis*; holo: MEL.

Seuocio pinuatifolius A.Rich. var. *pleiocephalus* (Rodway) Belcher, *Muelleria* 9: 127 (1996), *nom. inval.*; N.G. Walsh, *Fl. Victoria* 4: 949 (1999). [Belcher (1996) made this new combination based on the erroneous idea that *S. pectinatus* var. *pleiocephalus* Rodway was validly published as a new variety. Bentham published this variety in 1867 based on *S. leptocarpus*. If treated as a new variety, i.e. as *S. pinuatifolius* var. *pleiocephalus* Belcher, it would also be invalid as no latin diagnosis was given.]

?*S. rupicola*, A.Rich., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 119, t. 37 (1834). *Type:* Tasmania, 'Van Diemen's Land' A. *Lessou 19*, 1828; holo: P.

Plants to c. 1 m tall, erect or suberect, or ascending from a horizontal rhizome and then aerial branches absent or few, with tap-root poorly or moderately developed. *Leaves* in mid-region of stems and major branches 2–10 cm long, with marginal points 5–25 per side, often divided, occasionally not, subfleshy; base attenuate, without segments; margin denticulate or serrate; undivided leaves oblanceolate, rachis 2–8 mm wide; divided leaves with up to 6 oblong or elliptic segments per side, average position distal to mid leaf. *Uppermost leaves* commonly elliptic; base attenuate or cuneate, sometimes with basal segments. *Inflorescences* of 3–15 capitula; bract-axils hairy, with hairs short; peduncles with sparse to somewhat dense indumentum of short hairs. *Capitulum:* calycular bracteoles 6–12, not or mildly imbricate at anthesis, ovate to narrow-ovate, 1.5–3.0 mm



Figure 12. *S. pinnatifolius* var. *capillifolius* (J.S. Whinray 8806 MEL)

long, 0.6–1.2 mm wide, margin commonly \pm densely haired, pigmented dark purple black apically, with mark c. 0.5–1 mm long; involucre 3.5–6.0 mm long, 3–4 mm diam.; phyllaries mostly c. 13, with apex brown or black; stereome slightly fleshy, sometimes slightly pubescent; resin ducts well-developed, orange; inner phyllaries: chevron absent or rarely obscure; margin 0.2–0.3 mm wide 1 mm below apex broadening to 0.3–0.4 mm wide proximally; outer phyllaries: margin c. 0.1 mm wide 1 mm below apex broadening to c. 0.2 mm wide proximally. *Ray florets* mostly c. 13. *Acheues* 2.5–3.5 mm long, generally c. 50–75% of length of phyllaries, with papillose hairs in narrow bands, or achenes glabrous; hairs of achenes of ray florets not exceeding pappus-ring. (Fig. 13)

Distribution and Habitat: Occurs in south-eastern Australia. On the mainland it extends from the Brindabella Ranges in south-eastern New South Wales south to the Kosciuszko region in far south-eastern New South Wales, and south-east to the highlands of eastern Victoria. In Tasmania it occurs in the north-central region and further south-east on Mt Wellington (Fig. 7f). Grows at moderate to high altitudes in forest, woodland and alpine meadows.

Notes: Var. *alpinus* is largely separated geographically and altitudinally from other varieties. It has oblanceolate leaves with relatively distally positioned marginal points or segments; however smaller-leaved forms are sometimes difficult to distinguish from var. *pinnatifolius*. Var. *alpinus* is generally also recognisable by the pubescence on both the peduncle and bracteole margins.

Selected specimens examined: NEW SOUTH WALES: Kanangra-Boyd National Park near Boyd River Camping Ground, *K. McDougall 708 & M. Gray*, 2.xii.1999 (CANB); Brindabella Range, Mt Ginini, *S.R. Corbett*, 8, 11.xii.1980 (CANB); Cotter River District, Summit plateau area of Mt Gingera, Bimberi Range, *R. Schodde 1246*, 10.i.1961 (AD, CANB, NSW); Cascade trail, nr Dead Horse Gap, Snowy Mtns, *J.I. Raine ANU10356*, 27.ii.1971 (CANB); Near Cabramurra, *C.W.E. Moore*, 20.xii.1963 (CANB); Southern Tablelands, Mt Kosciusko National Park, opposite Blue Lake along main track from Charlotte Pass to Mt Kosciusko via Club lake, *P.S. Short 4000*, *K. Watanabe, T. Yahara, T. Denda & Y. Suzuki*, 5.ii.1993 (AD, CANB, MEL, NSW); Kosciusko National Park, Below Seamans Hut toward Snowy River Bridge, *B. Barnsley 1292, J. Rymer & R. Jackson*, 19.ii.1980 (CANB, HO); Kosciusko National Park, Gurraigorambra Range, Mount Morgan, summit ridge, *J. Pena I & K. Er*, 12.i.1994 (CANB, MEL, NSW, PERTH); Clarke Gorge, Cave Creek, Coolamon Caves area, 44 km NNE of Kiandra, *P.C. Jobson 4613, R.G. Coveny & P.G. Kodela*, 26.i.1997 (MEL, NSW). VICTORIA: Cope Hut, Bogong High Plains, *MUMC*, 31.xii.1964 (CANB); Bentley's Plain: 30.6 km from Ensay toward Tongio, *E.M. Canning 1491*, 5.i.1969 (CANB); Bogong High Plains, Near Wilkinson Lodge, *T.B. Muir 2810*, 27.ii.1963 (MEL); Along roadside, 4.5 km (by road) SE of General Store at Hotham Heights, *D.E. Albrecht 220 & B.J. Conn*, 23.ii.1984 (AD, MEL); Bogong High Plains, 1.7 km NW of Marm Point, on verge of Big River Fire Track, *R.J. Adair 1628*, 20.ii.1982 (MEL); Benambra-Wulgulmerang Road, Native Dog Plain, Buchan River Area, \pm 19.2 m [30.8 km] by road from Snowy River Road, *A.C. Beanglehole 33316, K.C. Rogers & E.W. Finck*, 7.i.1970 (MEL); 4.2 km SE of Falls Creek PO, c. 300 m SW of quarry, *R.E. Miller 3*, 7.ii.1996 (MEL). TASMANIA: Ben Lomond National Park, along cross-country track east of ski village, *R.J. Bayer TAS-00010, D. Les, G. Chandler, L. Ainouche & A. Baumel*, 17.i.2000 (CANB, HO); Mt Field National Park, c. 11 km from National Park township along road to Lake Dobson, *P.S. Short 1846*, 25.i.1983 (CANB, MEL); Hatfield river Crossing, c. 27 ml [45 km] from Rosebery toward Wynyard, *E.M. Canning*, 28.i.1969 (CANB); Mt Field National Park, *E. Ganba*, 5.iii.1951 (CANB); Quamby Bluff (mid NE slope) 2 km SW of Golden Valley, *A. Moscal 12568*, 6.iii.1986 (HO, MEL).

4g. *Senecio pinnatifolius* var. *maritimus* (Ali) I.Thomps., stat. et coub. uov.

S. lautus subsp. *maritimus* Ali, *Austral. J. Bot.* 17: 171 (1969), *pro parte* incl. type.

Type: South Australia, D'Estrees Bay [Kangaroo Island], *R. Tate s.n.*, c. 1880; holo: AD [Ali's citation mistakenly places D'Estrees Bay on the west coast of South Australia south of Ceduna].

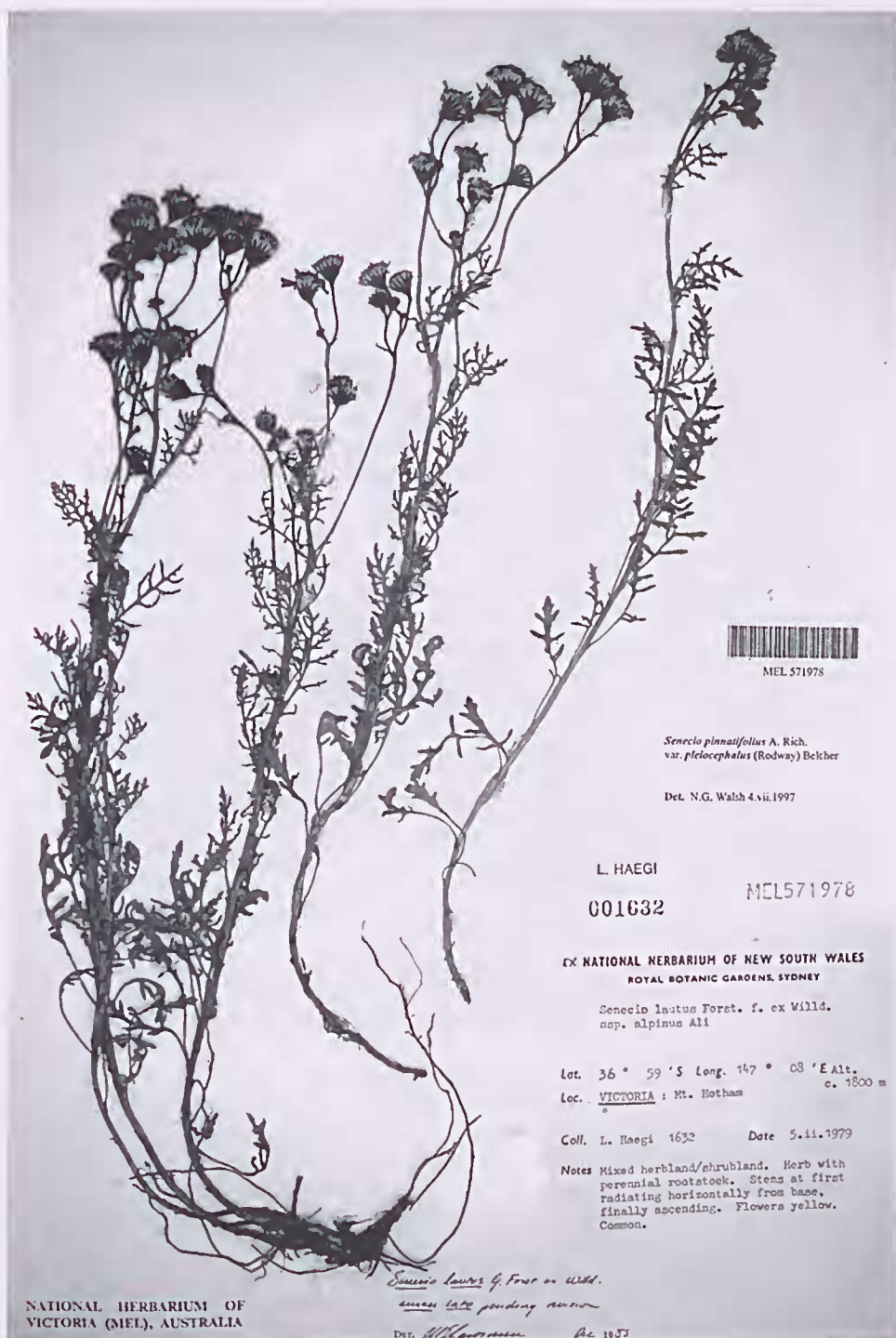


Figure 13. *S. pinnatifolius* var. *alpinus* (L. Haegi 1632 MEL).

S. pinnatifolius var. 2 *sensu* N.G. Walsh, *Fl. Victoria* 4: 948 (1999), *pro parte minore* [noted as extreme variants from south-western Victoria].

Plants to c. 0.4 m tall, sprawling to prostrate, with tap-root poorly or moderately developed. Leaves in mid-region of stems and major branches, 0.4–5 cm long, with marginal points 0–8 per side, divided or not; base attenuate to cuneate, without segments; margin entire or denticulate; fleshy and succulent, drying wrinkled; undivided leaves obovate to oblanceolate, spatulate or oblong to narrow-linear, with rachis 1–8 mm wide; divided leaves with 1–3 oblong to narrow-oblong segments per side, with average position c. midleaf. Uppermost leaves: base narrow or slightly to strongly dilated, with rounded auricles slightly stem-clasping. Inflorescences of 1–7 capitula; bract-axils variously hairy; peduncles glabrous. Capitulum: calycular bracteoles 6–10, usually not imbricate at anthesis, narrow-ovate, 1.5–2.5 mm long, 0.8–1.5 mm wide, with margin glabrous, or hairy, pigmented light or dark purple apically, with mark c. 0.5 mm long, or unpigmented; involucre 4.0–7.0 mm long, 3–6 mm diam.; phyllaries mostly c. 13, with apex brown, purple or unpigmented; stereome fleshy and succulent; resin ducts indistinct or not, pale; inner phyllaries: chevron absent, or occasionally weakly developed; margin 0.2–0.3 mm wide 1 mm below apex, broadening, to 0.4–0.8 mm wide proximally; outer phyllaries: margin c. 0.1 mm wide 1 mm below apex, broadening to c. 0.2–0.4 mm wide proximally. Ray florets c. 13. Achenes 2.0–3.0 mm long, generally c. 40–50% of length of phyllaries, olive-brown, brown or golden, with papillose hairs in broad bands; achenes of ray florets commonly pale orange-tan or reddish (on mainland); hairs of achenes of ray florets mostly exceeding pappus-ring. (Fig. 14)

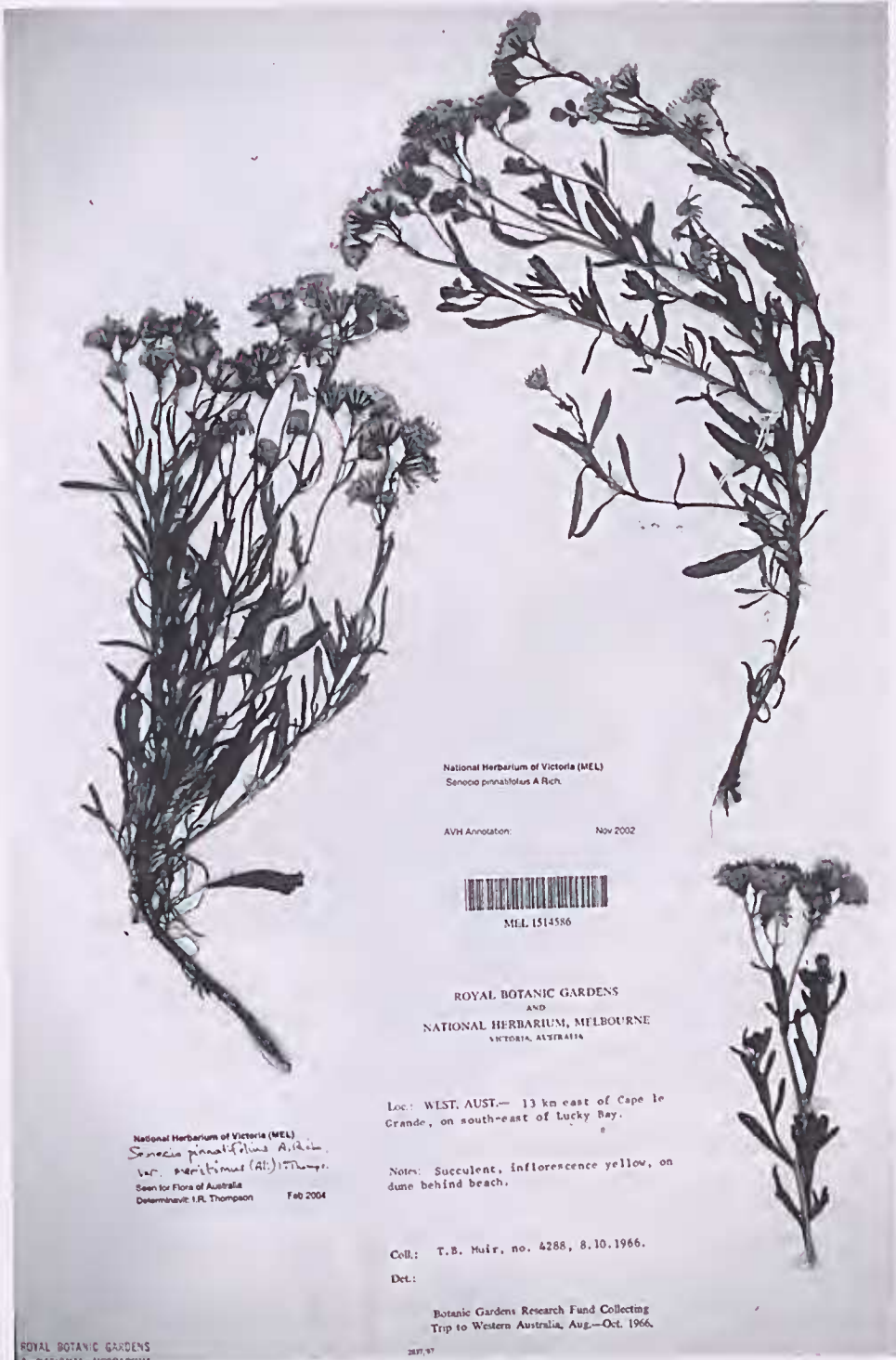
Distribution and Habitat: Occurs on the coast of southern Australia from Cape Otway in western Victoria west to south-western Western Australia, and in western Tasmania (Fig. 7g). Although records from central South Australia westwards are few, this variety is probably quite widespread in these regions. Grows on rocky cliffs, in rocky crevices and in sand dunes, and is commonly associated with limestone.

Notes: This variety can be difficult to distinguish from coastal forms of var. *lanceolatus* and var. *pinnatifolius*, and from *S. spanomerus* q.v. Var. *maritimus* intergrades and/or hybridises with *Senecio spanomerus* along the South Australian coast. Similarities in leaf and achenial morphology suggest a close relationship between these taxa.

In the Tasmanian form of var. *maritimus*, the uppermost leaves are more dilated basally, the calycular bracteoles are smaller and the achenes are differently coloured (achenes of ray florets olive-brown rather than reddish, achenes of disc florets golden rather than brown) compared to the mainland form. The Tasmanian form can be difficult to distinguish from *S. spathulatus* var. *spathulatus* which occupies similar coastal habitats (see notes under the latter).

Var. *maritimus* differs from the coastal form of var. *pinnatifolius* that is widespread along the east coast of Australia including Tasmania (and previously identified as *S. lantus* subsp. *maritimus*) by having fleshier leaves, generally fewer leaf segments (if present) and with a lower length:width ratio, shorter achenes relative to the length of the phyllaries, and the rachis of upper-branch leaves broader near the base and never developing strap-like basal segments (examples presented in Fig. 1d).

Selected specimens examined: WESTERN AUSTRALIA: Cape le Grande, T.B. Muir 4283, 7.x.1966 (MEL); On frontal dunes at Thistle Cove beach, I. Solomon 302, 12.x.1989 (PERTH); Shire of Oldfield, coastal sand dunes, ca. 14 km east of the mouth of Oldfield River, A.E. Orchard 1477, 12.x.1969 (AD, PERTH); Channel Rocks 18 km from Yallingup, N.C. Ollerenshaw NCO162 & N. Carriage, 10.x.1975 (CANB); Dyers Is., off S coast Rottnest Island, J.W. Green 521, 20.ix.1956 (PERTH). SOUTH AUSTRALIA: c. 15 km south-east of Cape Banks – ca. 35 km south of Mt. Gambier, J.B. Cleland s.n., 26.ii.1945 (AD); Cape du Couedie Lighthouse, E.N.S. Jackson 4379, 22.viii.1982 (AD, MEL); Kangaroo Island, Pennington Bay, D. Symon 14292, 12.i.1987 (AD). VICTORIA: Cape Grant, A.C. Beaglehole s.n. (MEL); Cape Bridgewater Car



National Herbarium of Victoria (MEL)
Senecio pinnatifolius A Rich.

AVH Annotation: Nov 2002



MEL 1514586

ROYAL BOTANIC GARDENS
AND
NATIONAL HERBARIUM, MELBOURNE
VICTORIA, AUSTRALIA

Loc: WEST. AUST.— 13 km east of Cape le Grande, on south-east of Lucky Bay.

Note: Succulent, inflorescence yellow, on dune behind beach.

Coll.: T.B. Muir, no. 4288, 8.10.1966.

Det:

Botanic Gardens Research Fund Collecting
Trip to Western Australia, Aug.—Oct. 1966.

National Herbarium of Victoria (MEL)
Senecio pinnatifolius A. Rich.
var. *maritimus* (A.C. Thompson)
Seen for Flora of Australia
Determined by: I.R. Thompson Feb 2004

ROYAL BOTANIC GARDENS
MELBOURNE, VICTORIA, AUSTRALIA

287/97

Figure 14. *S. pinnatifolius* var. *maritimus* (T.B. Muir 4288 MEL).

Park, 25 km W of Portland, *P.C. Jobson* 2096, 13.iv.1993 (MEL); Cape Nelson, *A.C. Beanglehole s.n.*, Oct. 1962 (MEL); Cape Duquesne (Petrified forest area), *I.R. Thompson* 734 & *J. Stubbings*, 1.i.2002 (AD, MEL); Cape Nelson, on cliff ledge by lighthouse, *M.E. Phillips* 462, 27.x.1963 (CANB). TASMANIA: 2 km NW of Nye Bay, *A.M. Buchanan* 7902, 16.i.1986 (HO); Pegg Creek, Hartwell Cove, *A. Moscal* 10008, 7.iii.1985 (AD, HO); Near mouth of Flat Creek, *A.M. Buchanan* 5782, 22.ii.1985 (AD, HO); Cypress Creek, *A. Moscal* 9722, 21.ii.1985 (HO); 5 km south of Endeavour Bay, *A. Moscal* 6008, 30.i.1984 (AD, HO, MEL); Suicide Bay, Woolnorth Station, *A.C. Rozefelds* 1382, 19.i.1999 (HO); Rupert Point, *W.D. Jackson* 345, Jan. 1954 (HO).

4h. *Senecio pinnatifolius* A.Rich. var. *leucocarpus* I.Thomps., var. *nov.*

A varietate typica foliis carnulosioribus, acheniis longioribus, indumento acheniorum densiore differt.

Type: Western Australia, Dempster Inlet, Middle Mount Barren, *C.A. Garduer* 9194, 21 Sept. 1948; holo: PERTH; iso: PERTH

Plants to 0.2 m tall, sprawling or prostrate; roots not known. *Leaves* in mid-region of stems and major branches 1.0–2.0 cm long, with marginal points 0–2 per side, divided or not, fleshy, drying somewhat wrinkled; base cuneate to attenuate, without segments; margin entire; undivided leaves oblanceolate to narrow-elliptic, with rachis 2–3 mm wide; divided leaves with 1 narrow-oblong segment per side, with average position slightly proximal. *Uppermost leaves* sometimes narrow-oblong; base ± truncate, sometimes minutely auriculate. *Inflorescences* of 1–5 capitula; bract-axils: hairs short and inconspicuous; peduncles glabrous. *Capitula:* calycular bracteoles 8–10, slightly imbricate at anthesis, ovate to narrow-ovate, 2.0–3.0 mm long, 0.8–1.5 mm wide, with margin ± glabrous, pigmented dark purple apically, with mark c. 0.5 mm long; involucre 5.0–6.0 mm long, c. 4 mm diam.; phyllaries mostly c. 13, with apex dark purple; stereome fleshy, succulent; resin ducts indistinct; inner phyllaries: chevron absent; margin 0.2–0.3 mm wide 1 mm below apex, broadening to c. 0.6 mm wide proximally; outer phyllaries: margin vestigial 1 mm below apex, broadening to c. 0.2 mm wide proximally. *Ray florets* c. 13. *Achenes* 4.0–4.5 mm long, generally c. 70% of length of phyllaries, appearing white, with papillose hairs obscuring the entire surface; hairs of achenes of ray florets exceeding pappus-ring. (Fig. 15)

Etymology: The varietal epithet refers to the colour of the densely hairy achenes (Gk. *leucos*, white, and *carpos*, fruit).

Distribution and Habitat: Known only from the type locality at Dempster Inlet, east of Esperance (Fig. 7h). There is no locality information but it appears to be a coastal plant.

Notes: This variety is readily recognised by a combination of small, crowded fleshy leaves and long, densely hairy achenes.

5. *Senecio spanomerus* I.Thomps., sp. nov.

A *S. pinnatifolius* A.Rich. nodis foliorum paucioribus proximalibus, bracteis lanceolatis, acheniis modice dimorphis differt; a *S. lacustrino* I.Thomps. plantis perennis, capitulis brevioribus, phyllariis plerumque pluribus, bracteis majoribus, acheniis brevioribus differt.

Type: South Australia, c. 7 km [4 miles] east of Kiki, *R.L. Specht*, Aug. 1961; holo: MEL; iso: MEL.

S. lautus subsp. *dissectifolius* Ali, *Austral. J. Bot.* 17: 168 (1969), *pro parte* incl. type; J.H. Willis, *Handb. Pl. Victoria* 2: 751 (1972), *pro parte*. *Type:* Victoria, Wyperfeld National Park, NW Mallee, *J.H. Willis*, 16 July 1961; holo: MEL.

S. pinnatifolius var. 1 *sensu* N.G. Walsh, *Fl. Victoria* 4: 948 (1999).



Western Australian Herbarium
 PERTH 00543942

National Herbarium of Victoria (MEL)
Senecio pinnatifolius Hitchc.
 var. *leucocarpus* C. Gardner
 Seen for Flora of Australia
 Determinavit I.R. Thompson Feb 2004



STATE HERBARIUM.
 WESTERN AUSTRALIA.
Senecio laetus Sm.
 Loc. Deception Point, Mitchell River Basin
 Coll. C. A. GARDNER. 9194 21. Sept 1948

Senecio laetus ssp. *magnum* DC
 88.1963
 Determinavit S.P. 86

C.A. Gardner 9194

Figure 15. *S. pinnatifolius* var. *leucocarpus* (holo: C.A. Gardner 9194 PERTH).



Figure 16. Distribution of a. *Senecio pinnatifolius*; b. *S. spanomerus*; c. *S. brigalowensis*; d. *S. depressicola*; e. *S. eremicola*; f. *S. lacustrinus*; g. *S. hamersleyensis*; h. *S. condyus*.

Perennial to c. 1.0 m tall, usually erect, nearly glabrous or with scattered long hairs. *Taproot* well-developed, often becoming stout and woody; secondary roots fine. *Leaves* in mid-region of stems or major branches mostly 2–10 cm long, with marginal points 0–4(–6) per side, usually divided, subfleshy to fleshy, succulent on coast, sometimes with scattered hairs; base very narrow; margin entire, or rarely with a few denticulations; undivided leaves linear to narrow-linear; divided leaves with 1 or 2 (or occasionally 3) narrow-oblong to narrow-linear segments per side, with average position central or proximal to mid leaf, with rachis to 2 mm wide. *Uppermost leaves* sometimes dilated basally and developing segments from this dilated region, average position of segments usually proximal. *Inflorescences* of 3–20 capitula; bract-axils commonly conspicuously hairy. *Capitula*: calycular bracteoles 8–12, lanceolate, mostly 1.5–3.5 mm long, 0.5–1.0 mm wide, with margin often bearing coarse white hairs; apex acute to peracute, pigmented black or brown in zone c. 0.5–1 mm long; involucre 4.0–6.0 mm long, 3–4 mm diam.; phyllaries c. 13 in all or most capitula or c. 20 in all or most capitula, with apex usually strongly pigmented brown or black; stereome slightly fleshy, often drying bronze; resin ducts well-developed, commonly orange on drying; inner phyllaries: broader stereomes 0.5–1.0 mm wide; margin 0.1–0.2 mm wide 1 mm below apex, similar in width or broadening to 0.2–0.3 mm wide proximally; outer phyllaries: margin vestigial 1 mm below apex remaining vestigial or broadening to c. 0.1 mm wide proximally. *Florets* 40–60; ligulate florets 8–13, often fewer than phyllaries, with ligule 6–12 mm long; corolla of disc florets 4–6 mm long. *Achenes* 1.8–2.8 mm long, 40–50% of length of phyllaries, with indumentum and attachment points on receptacle usually slightly dimorphic; achenes of disc florets brown, with ribs not or hardly convex; papillose hairs in broad bands covering 50–90% of surface, with l:w ratio c. 5, typically slightly exceeding pappus-ring; achenes of ray florets reddish, with papillose hairs slightly longer, covering all or most of surface, exceeding pappus-ring. *Pappus* 4–5 mm long. (Fig. 17)

Flowers mostly late winter and spring.

Etymology: The epithet alludes to its relatively simple leaf, i.e. with few or no marginal points or pinnate segments (Gk. *spanos*, few; *meros*, parts).

Distribution and Habitat: Occurs predominantly in south-eastern Australia, extending from south-western South Australia east through south-eastern South Australia to the Weddin Mountains in south-central New South Wales and to Bendigo in north-central Victoria. A possible outlier has been recorded from near Mt Buraminy north-east of Esperance in southern Western Australia. (Fig. 16b). Grows predominantly in semi-arid environments in sandy and loamy soils in lowland plains and sandhills, including coastal dunes.

Notes: *Senecio spanomerns* can be distinguished from most varieties of *S. pinnatifolius* using a combination of the following characters. Most of these are presented above in the key to species and include: the shape, pigmentation, texture, and indumentum of the calycular bracteoles, the number and positioning of leaf-segments, the lack of development of straplike basal segments from a narrow base, the lack of marginal points, phyllary number and the narrower hyaline margin of phyllaries, and the relatively short achenes with hairs overtopping the pappus-ring. Forms of *S. pinnatifolius* var. *pinnatifolius* occurring on the tablelands of New South Wales and southern Queensland and also in south-western Western Australia are particularly close to *S. spanomerns* but they have finer leaf rachides and segments, their leaves often have straplike basal segments arising from a narrow base, their capitula and calycular bracteoles are generally smaller, and the bracteoles are often purple-tipped.

Along the coast of South Australia the distributions of *S. spanomerns* and *S. pinnatifolius* var. *maritimus* tend to overlap, and these two taxa may be difficult to distinguish, especially because of the stunting effect of the coastal environment. *S. spanomerns* is an erect plant with less fleshy leaves. Its leaf rachides and segments have



Figure 17. *S. spanomerus* (holo: R.L. Specht MEL).

a higher length:width ratio and do not develop marginal points in the distal third. It generally has more capitula per inflorescence, and phyllaries with a narrower hyaline margin. Hybrids between these two taxa are also likely to occur.

Senecio spanomerus is also similar to *S. lacustrinus* which replaces it in more arid regions to the north and west. Differences between these species are discussed under the latter.

Selected specimens examined: **WESTERN AUSTRALIA:** Roe botanical district, 10.5 km NE of Mt Buraminya, *W.R. Archer 27069211*, 27.vi.1992 (MEL); 19.5 km SE Mundrabilla Hotel, *B. Downing 993*, 1.x.1984 (CANB, PERTH); Frazer range, 79 miles [130 km] E of Norseman, *M.E. Phillips*, 3.ix.1968; 1 km from Point Malcolm homestead, west of Israelite Bay, *E.C. Nelson ANU16529*, 15.ix.1972 (CANB); Eyre Bird Observatory, Nuytsland Nature Reserve, *T.R. Lally 377*, 25.ix.1994 (CANB, HO, PERTH). **SOUTH AUSTRALIA:** Eastern side of Murray Road from Murray Bridge to Mannum on corner of road to Bow Hill, *D.J.E. Whibley 8683*, 1.xi.1983 (AD, MEL); 39 mls [62 km] east of Kyancutta, Eyre Highway, *R.V. Smith s.n.*, 10.ix.1964 (MEL); Dark Island Heath, Keith, plot 6, *R.L. Specht*, Aug. 1961 (MEL); 5 miles [8 km] west Murray Bridge, *R. Filson 3018*, 4.viii.1960 (MEL); Yorke peninsula. Pine Point – e. 18 km S of Ardrossan, e. 23 m behind main primary dune at top of beach, *R.V. Smith 8911*, 13.ix.1989 (AD, CANB, MEL); Lake Frome, *R.J. Bates 75099*, 5.xi.1993 (AD, MEL); Innes National Park, Yorke Peninsula, *M.E. Lawrence 501*, 9.viii.1976 (MEL). **NEW SOUTH WALES:** e. 50 km E of Forbes, Eugowra–Cudal Rd, W of Cudal just before Murga Sawmill, *R. Cousens s.n.*, Sept. 1992 (CANB, NSW); 30 km west of Euston, *W.E. Mulham 1348*, 6.x.1978 (CANB). **VICTORIA:** S end of Hattah-Kulkyne National Park, Bulldozed firebreak 200 m E of Calder Highway, 100 m S of roadside stop. Roadside stop is 27.3 km N of Ouyen, *K. McFarlane 126*, 22.viii.1996 (MEL); Glenlee Flora and Fauna Reserve, *A.C. Beaglehole 84321*, 13.ix.1986 (AD, MEL); Little Desert National Park, central block. Broughton's Waterhole, 23 km SSE of Kaniva, *I.C. Clarke 2318*, 20.x.1993 (CANB, MEL); Kamarooka State Forest, 2.3 km along East Kamarooka Road from Elmore–Raywood Road, *P.G. Neish 441*, 3.x.1997 (MEL).

6. *Senecio brigalowensis* I.Thomps., *sp. nov.*

A *S. pinnatifolio* A.Rich. plantis semper annuis, phyllariis plerumque pluribus, phyllariis quam ligulis pluribus differt; a *S. eremicola* I.Thomps. capitulis et acheniis brevioribus, pilis acheniorum brevioribus differt.

Type: Queensland. 3 miles [5 km] N of “Mooramin” Stn, *L.G. Adams 1267*, 12 Aug. 1964; holotype: BRI; isotype: CANB.

Annual to c. 0.5 m tall, erect, ± glabrous. *Taproot* well-developed; secondary roots tapering. *Leaves* in mid-region of stems or major branches mostly 3–12 cm long, with marginal points 5–20 per side, mostly divided, occasionally not, thin on drying; base attenuate or becoming dilated; margin with occasional teeth or denticulations; undivided leaves oblanceolate to narrow-elliptic; divided leaves with 2 or 3 narrow-triangular or narrow-oblong to linear segments per side, with average position central. *Uppermost leaves:* segments positioned proximally; base becoming more dilated with often long segments. *Inflorescences* sometimes congested, of 3–15 capitula; axils of bracts inconspicuously hairy. *Capitula:* calycular bracteoles 6–8, not imbricate at anthesis, narrow-ovate to lanceolate, 1.0–2.0 mm long, 0.5–0.8 mm wide, largely scarious, with margin often with scattered long hairs; apex peracute, pigmented dark brown in zone 0.3–0.5 mm long; involucre 4.0–5.0 mm long, 2.5–4 mm diam.; phyllaries c. 18–20 in all or most capitula, with apex pigmented light brown, or hardly pigmented; stercome thin to slightly fleshy, drying yellow-green or brown (base of capitulum contrastingly drying dark bronze-brown); resin ducts moderately developed, orange; inner phyllaries: broader stercomes 0.5–0.8 mm wide; margin c. 0.2 mm wide 1 mm below apex, similar in width proximally; outer phyllaries: margin vestigial to c. 0.1 mm wide throughout. *Florets* 40–60; ligulate florets mostly c. 13, fewer than phyllaries, with ligule 6–8 mm long; corolla of disc florets 4–5 mm long. *Achenes* homomorphic, 2.0–3.0 mm long, generally

e. 50% of length of phyllaries, golden, brown, olive-brown or green, with ribs not or hardly convex, papillose hairs in bands obscuring e. 50% of surface, \pm appressed, with l:w ratio e. 3; hairs of achenes of ray florets not or hardly exceeding pappus-ring. *Pappus* e. 4 mm long. (Fig. 18)

Flowers most times of the year.

Etymology: The epithet alludes to the distribution of this species in Brigalow (*Acacia harpophylla*) country in Queensland

Distribution and Habitat: Occurs in southern and central Queensland from Castle Rock north-west of Quilpie in the south-west east to Nanango in the south-east and north-east to near Mackay in the central-east (Fig. 16c).

Notes: *Senecio brigalowensis* is an annual with leaves pressing thin, with narrow to broad leaf-segments, with short capitula with many phyllaries, and the achenes with short and appressed papillose hairs. A form of *S. pinnatifolius* var. *pinnatifolius* that occurs further to the east and south than *S. brigalowensis* has similar capitula; however, it is commonly perennial, the leaf rachides and segments are all filamentous, the peduncle is longer, the phyllaries are more herbaceous (drying green or olive rather than yellow-green), the resin ducts more pronounced, the margin of the outer phyllaries are distinctly broader, and the bracteoles are often purple-tipped. The annual species *S. tuberculatus* Ali, although not lautusoid, is superficially similar to and is sympatric with *S. brigalowensis*, but the former is distinguished by the coarse hairs on the phyllaries and the much coarser pappus bristles, as well as by the greater length and narrowly lageniform shape of the achenes.

Selected specimens examined: QUEENSLAND: Glenmoral Gap, E foot of Dawson Range, Sawmill Road, 1 km off road to Brigalow Research Station, *I.R. Telford 11927*, 9.xi.1993 (BRI, CANB, NSW); SW of Rockhampton, e. 6 km NNW of Biloela, e. 400 m on side road from Callide Valley Railway Line through to Burnett Highway, *I. Radford s.n.*, 16.ix.1993 (BRI, CANB, MEL, NSW, PERTH); Warren Point Station, Mitchell, *P.N. Martensz*, 24.viii.1968 (CANB); 30 km N of Tambo, *R. Duthie 401*, 14.vii.1992 (CANB); 64.5 km N of Injune, just N of Wallaroo Station turnoff, *D.L. Jones 6277 & B.E. Jones*, 25.viii.1990 (CANB).

7. *Senecio depressicola* I.Thomps., *sp. nov.*

A S. pinnatifolio A.Rich. plantis semper annuis, phyllariis quam ligulis plerumque pluribus, ligulis brevioribus differt; a *S. eremicola* I.Thomps. capitulis pluribus minoribus, phyllariis vulgo paucioribus, acheniis brevioribus differt.

Type: South Australia, Goyder Lagoon, 25 km NNE of Clifton Hills Homestead, *F.J. Badman 1362*, 18 July 1984; holo: CANB; iso: AD, MEL.

Annual to e. 0.5 m tall, erect, \pm glabrous. *Taproot* well-developed; secondary roots tapering. *Leaves* in mid-region of stems or major branches mostly 3–12 cm long, with marginal points 10–30 per side, mostly divided, occasionally not, thin on drying; base attenuate or becoming dilated; margin with frequent teeth or denticulations; undivided leaves narrow-linear; divided leaves with 3–5 narrow-triangular or narrow-oblong to linear segments per side, with average position central, sometimes again divided. *Uppermost leaves*: segments occurring more proximally; base becoming more dilated with often long segments. *Inflorescences* of (3–)8–20 capitula. *Capitula*: calycular bracteoles 4–8, not imbricate at anthesis, narrow-ovate to lanceolate, 1.0–2.0 mm long, 0.3–0.7 mm wide, largely searious, margin subentire, nearly glabrous; apex peracute to filamentous, pigmented dark brown in zone 0.3–0.5 mm long; involucre 3.0–5.0 mm long, 2.5–4 mm wide; phyllaries often e 13, occasionally a higher percentage e. 18–20, with apex pigmented light or dark brown or hardly marked; sterome thin, drying yellow-green (receptacle drying dark bronze-brown); resin ducts indistinct to moderately developed,



HERBARIUM AUSTRALIENSE
152188
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National Herbarium of Victoria (MEL)
Senecio brigalowensis (Thunb.)
Holotype
Seen for Flora of Australia
Determined: J.R. Thompson Feb 2004

HERBARIUM AUSTRALIENSE
CSIRO, CANBERRA
Collected and distributed by Division of Land Research
and Regional Survey, CSIRO, Canberra

Name *Senecio*
Det. Date
Coll. L.G. Adams 1267 Date 12 Aug 1966
Loc. 3 miles N of Mooramin Sm, S. Kennedy Dist, Q'ld
Habit Occasional in red-brown cracking clay, with *Eucalyptus ornata* + *E. diuturna* woodland.
Notes Rather fleshy, grey-green annual with bright yellow flowers
Lat. 28°30'S Long. 157°5'E

Senecio laetus G. Forst ex Willd.
senecio laetis pendens var.
Det. *L. G. Adams* Nov 1965

HERBARIUM AUSTRALIENSE (CANB)
ADAMS 1267
Senecio laetus Forst. f. ex Willd.
ssp. *dissectifolius* All
Det. *L. G. Adams* July 1974

RETURNED 8-32 357
CANBERRA 2001-030/1155

Distributed by: B.S.
871 66

Figure 18. *S. brigalowensis* (holo: L.G. Adams 1267 CANB).

pale or orange; inner phyllaries: broader stereomes 0.7–1.2 mm wide; margin c. 0.25 mm wide 1 mm below apex similar in width proximally; outer phyllaries: margin vestigial to c. 0.1 mm wide throughout. *Florets* 40–60; ligulate florets often c. 8, sometimes 13, fewer than phyllaries, with ligule 4–7 mm long; corolla of disc florets 3–5 mm long. *Achenes* slightly dimorphic; disc achenes 1.6–2.5 mm long, generally c. 40–50% of length of phyllaries, olive-brown or dark brown, with ribs not or hardly convex, papillose hairs in bands obscuring most or all of surface, \pm appressed, with l:w ratio c. 5, equal with or exceeding pappus-ring; achenes of ray florets often reddish, usually appearing white due to coarse hairs, with hairs clearly exceeding pappus-ring. *Pappus* 2–4 mm long. (Fig. 19)

Flowers mostly late autumn–spring.

Etymology: The epithet alludes to the centre of distribution of this species in the Lake Eyre basin to the north-east of Lake Eyre (*L. depressus*, a depression, and *cola*, dwelling in).

Distribution and Habitat: Occurs in far north-eastern South Australia, south-western Queensland and in central-eastern Northern Territory (Fig. 16d). Grows in sands and grey clays, beside swamps and billabongs, and on flood plains of eastern central Australia, particularly those in the Lake Eyre basin north-east of Lake Eyre.

Notes: Similar to other lautusoid species of central Australia but characterised by its more numerous small capitula with short ligules, achenes and pappus. Robust specimens develop large pinnatisect to bipinnatisect leaves with numerous marginal points.

Selected specimens examined: **NORTHERN TERRITORY**: 171/2 m. [29 km] SW of Brunette Downs, *G. Chippendale*, 18.vi.1960 (BRI, CANB, DNA, MEL); 17 miles [28 km] WNW of Rankine River Police Station, *R.A. Perry 1551*, 18.vi.1948 (BRI, CANB); Shady Camp Stockyard, Burramurra, *B.G. Thomson 426*, 18.viii.1983 (DNA). **SOUTH AUSTRALIA**: Cadelga Outstation, Cordillo Downs station, *F.J. Badman 9768*, 11.x.1996 (AD); Goyder's Lagoon, *R.L. Crocker*, 16.vii.1939 (AD); 10 km W of Gidgealpa Homestead. Site 21, *N.P. & W.S. Survey & Research 1104*, 23.ix.1983 (AD); Cooroomunchera WH [Waterhole], Cooper Creek, *F.J. Badman 1290*, 18.vi.1984 (AD, MEL); Lake Etamunbanie, Pandie Pandie Station, *F.J. Badman 4962*, 21.viii.1991 (AD); Innamineka Regional Reserve; track to Coongie Lakes, c. 54 km from Innamineka-Cordillo Road, *R.W. Purdie 4530*, 30.vii.1997 (CANB). **QUEENSLAND**: Diamantina River, 11/2 miles [2.5 km] west of Roseberth Homestead, *R. Filson 3350*, 1.x.1960 (MEL); Ca. 21/2 km south-west of Nappa-Merrie Station, *R.H. Kuchel 2573*, 18.viii.1968 (AD, MEL); Birdsville, D.E. Boyland 180, 20.ix.1966 (BRI, MEL); 78 km SW of Boulfia, *R. Duhalde 417*, 16.vii.1992 (CANB); Near South Australian border between Innamineka and Nappa Merrie, *D.J.E. Whibley 2391*, 19.viii.1968 (AD); Mt Howitt Station, *S.T. Blake 11958*, 5.vii.1936 (AD, BRI); Near Carandotta Homestead, 50 km S of Urandangie, *V.J. Neldner 1493*, Oct. 1984 (BRI); Floodplains of Diamantina River, 4 km SW of "Davenport Downs, *R.W. Purdie 1180*, 16.ix.1977 (BRI).

8. *Senecio eremicola* I.Thomps., *sp. nov.*

A. S. pinnatifolio A.Rich. plantis semper annuis, phyllariis plerumque pluribus, phyllariis quam ligulis pluribus, acheniis dimorphis differt.

Type: Northern Territory, 5 km west of Ross River Homestead, *A.S. Mitchell 438*, 12 Sept. 1978; holo: DNA; iso: CANB.

Annual to c. 0.8 m tall, erect. *Taproot* well-developed; secondary roots tapering. *Leaves* in mid-region of stems or major branches mostly 3–12 cm long, with marginal points 5–30 per side, mostly lacely divided, occasionally not, thin on drying; base becoming dilated above midstem; margin usually dentate or denticulate; undivided leaves narrow-elliptic or oblanceolate; divided leaves with 3–5 lobes or narrow-triangular or narrow-oblong segments per side, rachis to 7 mm wide, with average position central, sometimes again lobed. *Uppermost leaves*: segments more proximal, with rachides much narrower; base becoming more dilated, truncate or slightly stem-clasping. *Inflorescences* of 2–12 capitula. *Capitula*: calycular bracteoles 6–12, not imbricate at anthesis, lanceolate to narrow-lanceolate, 1.5–3.0



National Herbarium of Victoria (MEL)
Senecio depressicola (Thunberg)
 HOLOTYPE
 Seen for Flora of Australia
 Determinant: I.R. Thompson Feb 2004

**EX STATE HERBARIUM OF SOUTH AUSTRALIA
 ADELAIDE (AD)**

Senecio lautus Forst. f. ex Willd.
 ssp. *maritimus* All.
 South Australia, Region 2: Lake Eyre Basin,
 26°49'S 139°01'E
 Goyder Lagoon, 25 km NE of Clifton Hills RG.
 Abundant, on grey soil flood plain.
 Erect or ascending habit.
 Flowers yellow.

ISIS
 DATABASE

CANBLOAN 2001-030/1437

CBG 8910791

F. J. BADMAN
 1362

F. J. Badman 1362 18.VII.1984

Figure 19. *S. depressicola* (holo: F.J. Badman 1362 CANB).

mm long, 0.4–1.0 mm wide, largely scarious, with margin nearly glabrous or with some weak hairs; apex peracute to filamentous, pigmented light brown in zone c. 0.3 mm long or scarcely pigmented; involucre 5.0–7.0 mm long, 4–6 mm diam.; phyllaries c. 20 in all or most capitula, with apex pigmented light brown or scarcely pigmented; stereome generally thin, drying yellow-green or yellow-brown; resin ducts moderately developed, pale or orange on drying; inner phyllaries: broader stercomes 0.5–1.2 mm wide; margin c. 0.3 mm wide 1 mm below apex, similar in width proximally; outer phyllaries: margin vestigial to c. 0.1 mm wide throughout. *Florets* 50–80; ligulate florets often c. 13, fewer than phyllaries, with ligule 8–14 mm long; corolla of disc florets 5–7 mm long. *Achenes* somewhat dimorphic; disc achenes 3.0–4.5 mm long, generally c. 60% of length of phyllaries, golden, or brown, olive-brown or green, with ribs not or scarcely convex; papillose hairs in bands obscuring c. 50–70% of surface, appressed or slightly divergent, with l:w ratio c. 7–10, slightly exceeding pappus-ring; achenes of ray florets commonly 3.5–5.0 mm long, dark-red, with hairs slightly longer and clearly exceeding pappus-ring; carpodium larger; attachment points for achenes on margin of receptacle enlarged. *Pappus* c. 5–6 mm long. (Fig. 20)

Flowers mostly winter to early spring.

Etymology: The epithet alludes to the desert environment in which the species is found (Gk. *eremia*, desert; and *cola*, dwelling).

Distribution and Habitat: Occurs in central Australia from Harts Range in southern Northern Territory south to Mt Illbillie in northern South Australia and disjunctly further west at Giles Rock in far eastern Western Australia (Fig. 16e). Grows in stream beds and beside waterholes in sandy and gravelly soils

Notes: *Senecio eremicola* is characterised by a combination of large lacccately dissected leaves, a high number of phyllaries per capitulum, and long achenes with mild dimorphism. It is similar to *S. depressicola* in leaf morphology, and similar to *S. lacustrinus* in achenial characters, and similar to *S. brigalowensis* in terms of phyllary number. The leaf morphology is reminiscent of that of *S. pinatifolius* var. *lanceolatus* and *S. pinatifolius* var. *serratus*; however, it differs from those taxa in capitular morphology.

Selected specimens examined: WESTERN AUSTRALIA: Great Victoria Desert, Giles Rock between Warburton Mission and Blackstone Range on Docker Mission Road, A.C. Beaglehole 60206, 19.ix.1978 (MEL). NORTHERN TERRITORY: Mt Cavenagh, ca. 17 km SW of Kulgera H.S., N.N. Domer 4279, 19.viii.1973 (DNA); Alice Springs old telegraph station, D. Nelson, 11.viii.1961 (DNA); Palm Valley, G. Chippendale, 25.viii.1956 (DNA); 22 km west of Simpson's Gap turnoff on the Alice Springs to Hermannsburg road, C.H. Miller & J.L. White 515, 6.ix.1986 (CANB); Hart's Range, 10 km S of Hart's Range Police Station, I.R. Noble 33, 3.x.1977 (CANB); George Gill Range, Stokes Creek, A.C. Beaglehole 23393, 8.vii.1967 (MEL).

9. *Senecio lacustrinus* l.Thomps., *sp. nov.*

A *S. pinatifolio* A.Rich., plantis plerumque annuis, phyllariis quam ligulis plerumque pluribus, acheniis dimorphis differt; a *S. eremicola* l.Thomps. caulibus saepe purpureis prope basin, foliis et segmentis angustioribus nodis paucioribus, phyllariis paucioribus differt.

Type: South Australia, far north-east, Strzelcecki Track, ca. 40 km east of Murnpeowie, D.J.E. Whibley 2325, 16 Aug. 1968; holotype: AD.

Annual to c. 0.8 m tall, erect. *Taproot* well-developed; secondary roots slender. *Leaves* in mid-region of stems or major branches mostly 3–12 cm long, with marginal points 0–10 per side, mostly divided, occasionally not, thin on drying; base attenuate or becoming dilated; margin entire or with a few teeth or denticulations; undivided leaves narrow-elliptic; divided leaves with 2 or 3 narrow-triangular or linear to narrow-linear segments per side, with average position central. *Uppermost leaves*: segments more

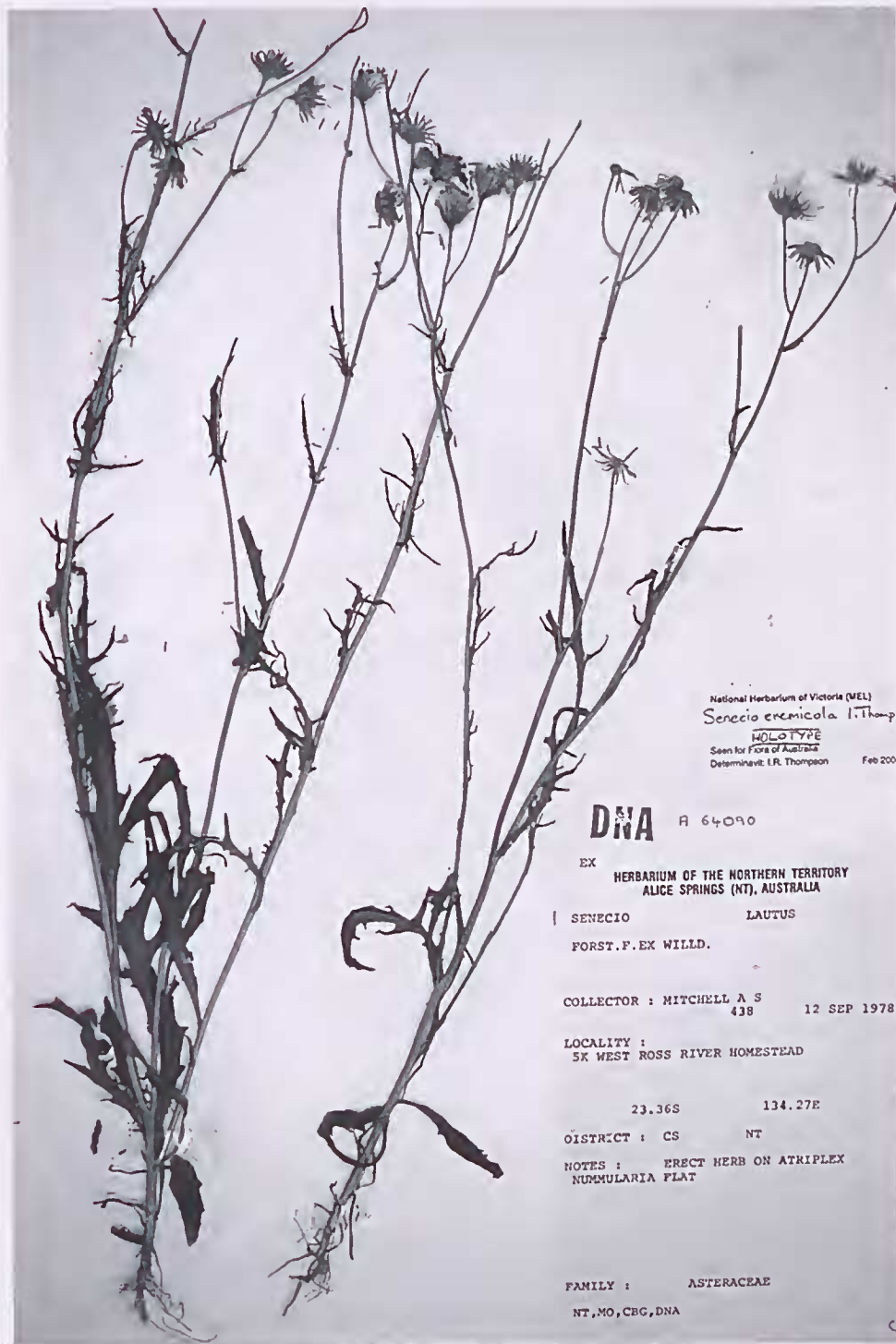


Figure 20. *S. eremicola* (holo: A.S. Mitchell 438 DNA).

proximal; base more dilated with often long segments. *Inflorescences* of 3–12 capitula. *Capitula*: calycular bracteoles 5–8, not imbricate at anthesis, narrow-ovate to narrow-lanceolate, 1.5–3.0 mm long, 0.4–1.0 mm wide, largely scarious, with margin nearly glabrous or with scattered short or long hairs; apex peracute, pigmented brown in zone c. 0.3 mm long, or hardly pigmented; involucre 5.0–9.0 mm long, 3–5 mm diam.; phyllaries c. 13 in all or most capitula, with apex pigmented light brown to blackish or hardly pigmented; stereome generally thin, drying yellow-green or yellow-brown (base of capitulum contrastingly drying dark bronze-brown); resin ducts weakly developed, usually pale; inner phyllaries: broader stereomes 0.8–1.5 mm wide; margin c. 0.3 mm wide 1 mm below apex, similar in width proximally; outer phyllaries: margin vestigial to c. 0.1 mm wide throughout. *Florets* 60–80; ligulate florets often c. 8, fewer than phyllaries, with ligule 10–15 mm long; corolla of disc florets 5–6 mm long. *Achenes* usually mildly dimorphic; disc achenes 2.8–4.0 mm long, generally c. 50–60% of length of phyllaries, golden, brown, olive-brown or green, with ribs not or hardly convex, papillose hairs in bands obscuring c. 50–70% of surface, appressed or slightly divergent, with l:w ratio 5–8, slightly exceeding pappus-ring; ray achenes commonly 3.0–4.5 mm long, dark-red, with hairs slightly longer and exceeding pappus-ring more clearly; attachment points on margin of receptacle enlarged. *Pappus* c. 5 mm long. (Fig. 21)

Flowers mostly winter to early spring.

Etymology: The epithet alludes to the typical occurrence of this species around lake or swamp margins (*L. lacustrinus*, of lakes).

Distribution and Habitat: Occurs in southern Australia in a broad band between latitudes 26° S and 32° S, and extending from Indarra Springs in far western Western Australia east through central South Australia to Bourke in north-western New South Wales (Fig. 16f). Grows in sandy or loamy soils, usually associated with ephemeral lakes and other water sources.

Notes: Similar to the more northerly distributed *S. eremicola* in habit and achene morphology but with fewer phyllaries per involucre and narrower leaf segments with fewer marginal points. Also similar to the more southerly and easterly distributed *S. spanouerus* but differing in the following ways: capitula slightly longer with never more than c. 13 phyllaries per capitulum, calycular bracteoles smaller relative to the involucre, achenes longer and the achenes of the ray florets generally longer than those of the disc florets. Furthermore, in *S. lacustrinus* the stereome of phyllaries are not as succulent (drying yellowish or greenish rather than coppery-brown) and its resin ducts are less prominent. It appears to be mostly an annual, but it can become shrub-like and develop semi-woody lower stems. *Senecio spanouerus*, on the other hand, is usually a perennial.

Specimens from Lake Throssell and Mt Elvire in south-central Western Australia have capitula 8 to 9 mm long, and the specimen from Lake Throssell is unusual in that it appears to be perennial. Both populations warrant further investigation.

Selected specimens examined: WESTERN AUSTRALIA: 43.2 miles [68 km] north of Cleary on road to Mouroubra, *B.H. Smith* 745, 20.ix.1986 (AD, CANB, HO, MEL, PERTH); Site L4C, 35 km E of Latham, on edge of Lake Mongers, *F. Keast LAC219*, 12.viii.1997 (PERTH); 5 km S of Morawa in samphire flats, *P.S. Short* 4368, 8.ix.1995 (MEL, PERTH); 33.4 km S of Perenjori on road to Wubin, *B.J. Lepschi BJL2725 & T.R. Lally*, 27.vii.1996 (PERTH); e. 54 km from Paynes Find along road to Cleary (eastern edge of Lake Moore), *P.S. Short* 2589, *N.S. Lander & B.A. Fuhrer*, 26.viii.1986 (AD, BRI, CANB, HO, MEL, NSW, PERTH); 150.5 mile post [240 km] on Great Northern Highway (near Wongan Hills), *E.M. Scrymgeour* 2096, 19.ix.1967 (PERTH); 6 km S of Maleolm, *R.J. Cranfield* 9878, 6.vii.1995 (CANB, PERTH); ca. 112 km east of Caiguna Tank, *N.N. Donner* 4663, 10.ix.1973 (PERTH); 17.5 km NNW of Mt Glasse, Bremer Range, *K. Newbey* 5634, 16.viii.1979 (PERTH); Blue Hill, 24.5 km S of Mt Elvire Station, 235 km N of Southern Cross, *D.J. Edinger* 1827, 23.iv.2000 (PERTH). SOUTH AUSTRALIA: Great Victoria Desert, N.C.S.S.A. Survey, Camp 6, Serpentine Lakes, 164 km W of Vokes Hill junction, *C.R. Alcock* 8308,

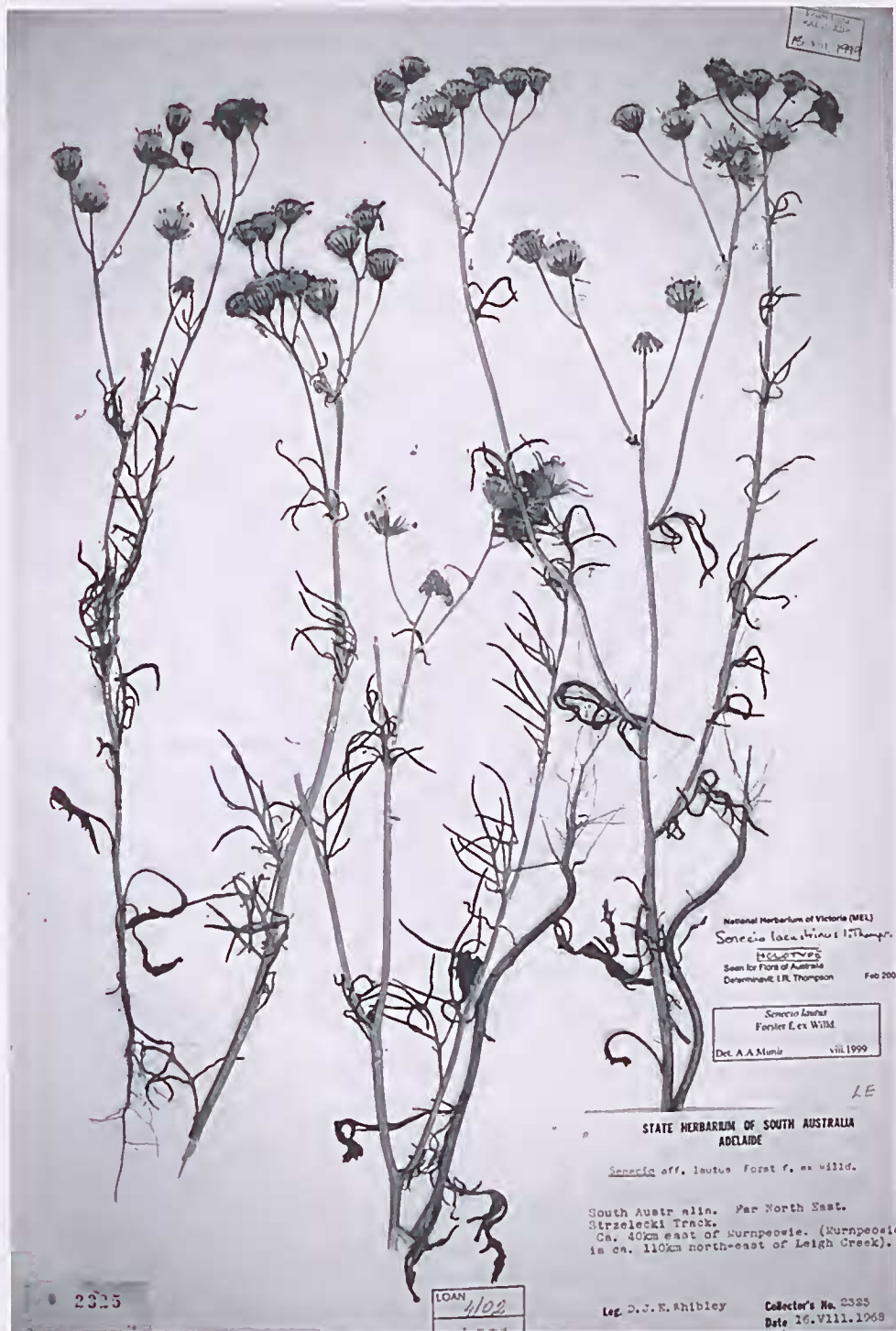


Figure 21. *S. lacustrinus* (holo: D.J.E. Whibley 2325 AD).

25.viii.1980 (AD, DNA, MEL); 1–1.5 km E of Mt Gunson, *B. Lay 1587*, 1.vii.1990 (AD, CANB, MEL); 27 m. [43 km] S of Marree, *A.C. Beauglehole 28140*, 2.viii.1968 (MEL); Paralana, springs 125 km N of Blinman, *J. Carrick 2043*, 24.viii.1968 (AD). **NEW SOUTH WALES:** Tero Creek Station, north of White Cliffs, *P. Martensz*, 3.xii.1968 (CANB); 3.5 km [2 ml] from Bourke, towards Cobar, *C.R. Dunlop 1056*, 26.viii.1969 (CANB); 68.3 km north-east of Louth on Bourke road, east of Darling river, *C.W.E. Moore 7846*, 15.ix.1978 (CANB).

10. *Senecio hamersleyensis* I.Thomps., *sp. nov.*

A *S. pinnatifolio* A.Rich. nodis foliorum paucioribus, margine foliorum semper integro, phyllariis quam ligulis pluribus; a *S. lacustrino* I.Thomps. basi foliorum nunquam dilatata, margine phyllariorum latiore, acheniis homomorphis, pilis acheniorum brevioribus differt.

Type: Western Australia, Hamersley Range, c. 19 km SE of Mt Hiditch, 138 km SE of Mt Tom Price, *W.R. Archer 1308941*, 13 Aug. 1994 (MEL).

Perennial to c. 1.5 m tall, erect. *Taproot* well-developed; secondary roots fine. *Leaves* in mid-region of stems or major branches mostly 3–8 cm long, with marginal points 0–2 per side, undivided or divided, thin on drying; base attenuate; margin entire; undivided leaves narrow-oblongate; divided leaves with 1 or 2 linear to narrow-linear or sometimes narrow-triangular segments per side, with average position central or slightly proximal to mid leaf. *Uppermost leaves* similar. *Inflorescences* of 1–10 capitula. *Capitula:* calycular bracteoles 6–10, not imbricate at anthesis, ovate to narrow-ovate, 1.0–2.0 mm long, 0.5–1.0 mm wide, largely scarios, with margin glabrous, sometimes with scattered short hairs; apex acute to peracute, pigmented light brown in zone c. 0.3 mm long; involuere (4.0–)5.0–7.0 mm long, c. 3 mm diam.; phyllaries c. 13 in all or most capitula, with apex light brown or hardly pigmented; sterome \pm thin, drying yellow-green or yellow-brown; resin ducts well developed, usually orange; inner phyllaries: broader steromes 0.8–1.2 mm wide; margin c. 0.3 mm wide 1 mm below apex, broadening to 0.5 mm wide proximally; outer phyllaries: margin c. 0.1 mm wide 1 mm below apex broadening to c. 0.2 mm wide proximally. *Florets* 40–60; ligulate florets commonly c. 8, fewer than phyllaries, with ligule 10–15 mm long; corolla of disc florets 4.5–7 mm long. *Achenes* \pm homomorphic, 2.5–3.0 mm long, generally 40–50% of length of phyllaries, brown, olive-brown, green, or reddish, with ribs not or hardly convex, with papillose hairs obscuring most of surface, appressed, with l:w ratio 3–5, not or barely exceeding pappus-ring. *Pappus* c. 5 mm long. (Fig. 22)

Flowers mostly winter to early spring.

Etymology: The epithet alludes to its centre of distribution in the Hamersley Ranges, Western Australia.

Distribution and Habitat: Occurs in far western Western Australia, mainly in the Hamersley Ranges; also further east along Savory Creek and further west in the Cape Range near Exmouth (Fig. 16g). Grows in gorges in red, gritty and skeletal soils on scree slopes and in sandy alluvial soils at the base of cliffs or amongst boulder rockpiles, usually with a southern aspect.

Notes: This species is similar to *S. lacustrinus* but is a perennial with attenuate leaf bases and entire leaf-margins, outer phyllaries with a broader margin, and with homomorphic achenes with shorter hairs.

Selected specimens examined: **WESTERN AUSTRALIA:** Dale Gorge, Hamersley Range, A.S. George 1043 (PERTH); Snell Gorge, *K.J. Atkins 498*, 28.vii.1979 (PERTH); Hamersley Range Nat. Park, Hancock Gorge, *G.W. Carr 4946* & *A.C. Beauglehole 48724*, 10.viii.1974 (MEL, PERTH); Yardie Creek, *A.S. George 10303* (MEL, PERTH); Hamersley Range, Knox Gorge, *A.C. Beauglehole 11515* (MEL, PERTH); Wittenoom, *McGuire 23*, Jan. 1972 (PERTH); Keartland district: Savory creek, *G.J. Morse 39*, 5.vi.1984 (AD, CANB, PERTH).

11. *Senecio condylus* I.Thomps., *Muelleria* 21: 18–20 (2005)

Type: Western Australia, Perth, City Beach, summit of sand dune c. 1 km N of Oceanic Drive, *L. Haegi* 1871, 25 Aug. 1979; holo: PERTH; iso: AD, NSW.

Annual to c. 0.3 m tall, erect, commonly with scattered long hairs. *Taproot* small; secondary roots fine. *Leaves* in mid-region of stems or major branches mostly 3–8 cm long, with marginal points 10–20, divided or not, slightly fleshy; base becoming cordate and weakly clasping; margin dentate or serrate, with teeth often numerous; undivided leaves very narrow-elliptic, very narrow-oblong or oblanceolate; divided leaves with up to 3 c. oblong segments per side, with average position central. *Uppermost leaves* narrow-oblong to linear or lanceolate, with scattered hairs variably persistent; base of hairs often somewhat persistent on lower surface. *Inflorescences* of 3–20 capitula. *Capitula:* calyicular bracteoles 8–12, sometimes slightly imbricate at anthesis, lanceolate to narrow-lanceolate, 2–3 mm long, 0.8–1.0 mm wide, with margin commonly hairy, pigmented dark purple apically with patch 1–1.5 mm long; involucre 4.0–6.0 mm long, 3–4 mm diam.; phyllaries c. 13 in all or most capitula, with apex intensely pigmented; stereome thin, often suffused with purple below apex; resin ducts fine, usually pale on drying; inner phyllaries: margin 0.3–0.6 mm wide; outer phyllaries: margin 0.1–0.2 mm wide. *Florets* 50–60; ligulate florets c. 8, fewer than phyllaries, with ligule 6–10 mm long; corolla of disc florets 5–6 mm long. *Achenes* dimorphic; disc achenes 2.0–3.0 mm long, brown, ribs \pm flat; papillose hairs covering c. 50–90% of surface, appressed, with l:w ratio c. 4, hardly exceeding pappus-ring; ray achenes 2.8–3.5 mm long; papillose hairs more robust, \pm completely covering surface, appressed, exceeding pappus-ring; carpodium much wider; attachment points on margin of receptacle distinctly enlarged. *Pappus* of achenes of ray florets hardly developed; pappus of achenes of disc florets 4–5 mm long.

Flowers mostly winter and spring.

Distribution and Habitat: Occurs in south-western Western Australia, in the Perth region and recorded once from Busselton (Fig. 16h). Grows in sandy soils.

Notes: This species has recently been described in a revision of the *S. glossanthus* complex Thompson (2005). It appears to provide a link between this complex and the Australian lautusoid complex. An old Victorian record is likely to be a transient introduction due to shipping activity between Perth and Melbourne.

Selected specimens examined: WESTERN AUSTRALIA: Lake Richmond Nature Reserve, S side, *A. Bellman* 27A, 4.viii.2000 (PERTH); Port Kennedy bushland, 15 km N of Mandurah, *G.J. Keighery & N. Gibson* 858, 3.ix.1992 (PERTH); Fremantle, *N. Ingleton*, Oct. 1947 (PERTH); Busselton, *M. Koch*, Oct. 1909 (PERTH); Fortview Road, Swanbourne, *R.J. Cranfield* 382, 24.viii.1978 (MEL, PERTH). VICTORIA: Coode Island, *J.R. Tovey & C. French*, 1918. (MEL).

Names of uncertain application

Senecio lautus var. *pilosus* J.M.Black, *Trans. & Proc. Roy. Soc. S. Australia* 52: 230 (1928).

Type: South Australia, West Coast, Franklin Island – ca. 40 km south-west of Ceduna, *T.G.B. Osborn s.n.*, Jan. 1922; holo: AD; iso: NSW.

This specimen has a relatively dense cover of coarse hairs. It is perhaps closest to *S. spanomerus* but the achenes have shorter, more closely appressed papillose hairs than is typical of this species. If further collections and field observations show that it forms populations that are consistent morphologically in terms of the indumentum, it will possibly deserve taxonomic recognition.



Figure 22. *S. hamersleyensis* (holo: W.R. Archer 1308941 MEL).

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References

- Ali, S.I. (1964). *Senecio lautus* complex in Australia. I. Taxonomic considerations and discussion of some of the related taxa from New Zealand, *Australian Journal of Botany* **12**, 282–291.
- Ali, S.I. (1969). *Senecio lautus* complex in Australia. V. Taxonomic interpretations, *Australian Journal of Botany* **17**, 161–176.
- Beleher, R.O. (1993). The '*Senecio* aff. *lautus*' complex (Asteraceae) in Australia. I. Criteria for exclusion of lautusoid *Senecio* of Australia from *S. lautus sensu stricto* of New Zealand. *Australian Systematic Botany* **6**, 359–363.
- Beleher, R.O. (1994). The '*Senecio* aff. *lautus*' complex (Asteraceae) in Australia. II. Clarification of names given to pseudolautusoid Australian specimens of *Senecio* by Richard and by Candolle. *Australian Systematic Botany* **7**, 71–85.
- Beleher, R.O. (1996). Australian alpine scapose radiate taxa of *Senecio* (Asteraceae) *Muelleria* **9**, 115–131.
- Bentham, G. (1867). *Senecio*. *Flora Australiensis* **3**, 661–673.
- Michael, P.W. (1992). *Senecio lautus sensu lato* – an unresolved complex. *Australian Systematic Botany Society Newsletter* **72**, 10–11.
- Ornduff, R. (1960). An interpretation of the *Senecio lautus* complex in New Zealand, *Transactions of the Royal Society of New Zealand* **88**, 63–77.
- Radford, I.J., Muller, P., Fiffer, S. & Michael, P.W. (2000). Genetic relationships between Australian Fireweed and South African and Madagascan populations of *Senecio madagascariensis* Poir. and closely related *Senecio* species. *Australian Systematic Botany* **13**, 409–423.
- Radford, I.J., Cousens, R.D., & Michael, P.W. (2004). Morphological and genetic variation in the *Senecio pinnatifolius* complex: are variants worthy of taxonomic recognition? *Australian Systematic Botany* **17**, 29–48.
- Scott, L.J., Congdon, B.C. & Playford, J. (1998). Molecular evidence that fireweed is of South African origin. *Plant Systematics and Evolution* **213**, 251–257.
- Thompson, I.R. (2005). Taxonomic studies of Australian *Senecio* (Asteraceae): 4. A revision of *Senecio glossanthus* and recognition of an allied species with long ligules. *Muelleria* **21**, 3–22.
- Walsh, N.G. (1999). *Senecio*. *Flora of Victoria* **4**, 941–965.

Index of Scientific Names

Epithets of accepted names are in roman (with bold type for new names) and synonyms are in italics. The taxon numbers refers to the number of the accepted species or varieties as given in the taxonomy section.

Name	Taxon no.	Page no.
Senecio		
<i>anacampserotis</i> DC.	2c	35
brigalowensis I.Thomps.	6	63
<i>capillifolius</i> Hook.f.	4c	51
<i>carnulentus</i> var. <i>angustissimus</i> Steetz	4b	45
<i>carnulentus</i> var. <i>latilobus</i> Steetz	4b	45
<i>condylus</i> I.Thomps.	11	73
<i>crithmifolius</i> A.Rich	4a	41
depressicola I.Thomps.	7	64
<i>endlicheri</i> DC.	4a	41
eremicola I.Thomps.	8	66
<i>gaudichaudianus</i> A.Rich.	4a	40
hamersleyensis I.Thomps.	10	72
lacustrinus I.Thomps.	9	68
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<i>lautus</i> subsp. <i>alpinus</i> Ali	4f	52
<i>lautus</i> subsp. <i>dissectifolius</i> Ali	4a, 5	41, 58
<i>lautus</i> var. <i>lanceolatus</i> Benth.	4c, 4d	47, 49
<i>lautus</i> subsp. <i>lanceolatus</i> (Benth.) Ali	4c, 4d	47, 49
<i>lautus</i> subsp. <i>uaritinus</i> Ali	4a, 4g	41, 54
<i>lautus</i> var. <i>capillifolius</i> (Hook.f.) F.Muell.	4c	51
<i>lautus</i> var. <i>pilosus</i> J.M.Black	?	73
<i>macquariensis</i> DC.	4a	41
<i>madagascariensis</i> Poir.	1	30
<i>oligocephalus</i> DC.	4a	41
<i>pectinatus</i> var. <i>pleiocephalus</i> Benth.	4f	52
<i>pectinatus</i> var. <i>pleiocephalus</i> Rodway	4f	52
<i>pinnatifolius</i> A.Rich.	4	38
<i>pinnatifolius</i> var. 1 <i>sensu</i> N.G. Walsh, Fl. Victoria 4 (1999)	5	58
<i>pinnatifolius</i> var. 2 <i>sensu</i> N.G. Walsh, Fl. Victoria 4 (1999)	4d, 4g	49, 56
<i>pinnatifolius</i> var. 3 <i>sensu</i> N.G. Walsh, Fl. Victoria 4 (1999)	4d	49
<i>pinnatifolius</i> var. <i>alpinus</i> (Ali) I.Thomps.	4f	52
<i>pinnatifolius</i> var. <i>capillifolius</i> (Hook.f.) I.Thomps.	4c	51
<i>pinnatifolius</i> var. <i>lanceolatus</i> (Benth.) I.Thomps.	4d	49
<i>pinnatifolius</i> var. <i>latilobus</i> (Steetz) I.Thomps.	4b	45
<i>pinnatifolius</i> var. leucocarpus I.Thomps.	4h	58
<i>pinnatifolius</i> var. <i>maritimus</i> (Ali) I.Thomps.	4g	54
<i>pinnatifolius</i> var. <i>pinnatifolius</i>	4a, 4d	40, 49
<i>pinnatifolius</i> var. <i>pleiocephalus</i> (Rodway) Belcher	4f	52
<i>pinnatifolius</i> var. serratus I.Thomps.	4c	47
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<i>spathulatus</i> var. attenuatus I.Thomps.	2c	35
<i>spathulatus</i> var. latifructus I.Thomps.	2b	35
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<i>tripartitus</i> Steud.	4a	40
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